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**Final
1991 Air Quality
Management Plan**

South Coast Air Basin

July 1991

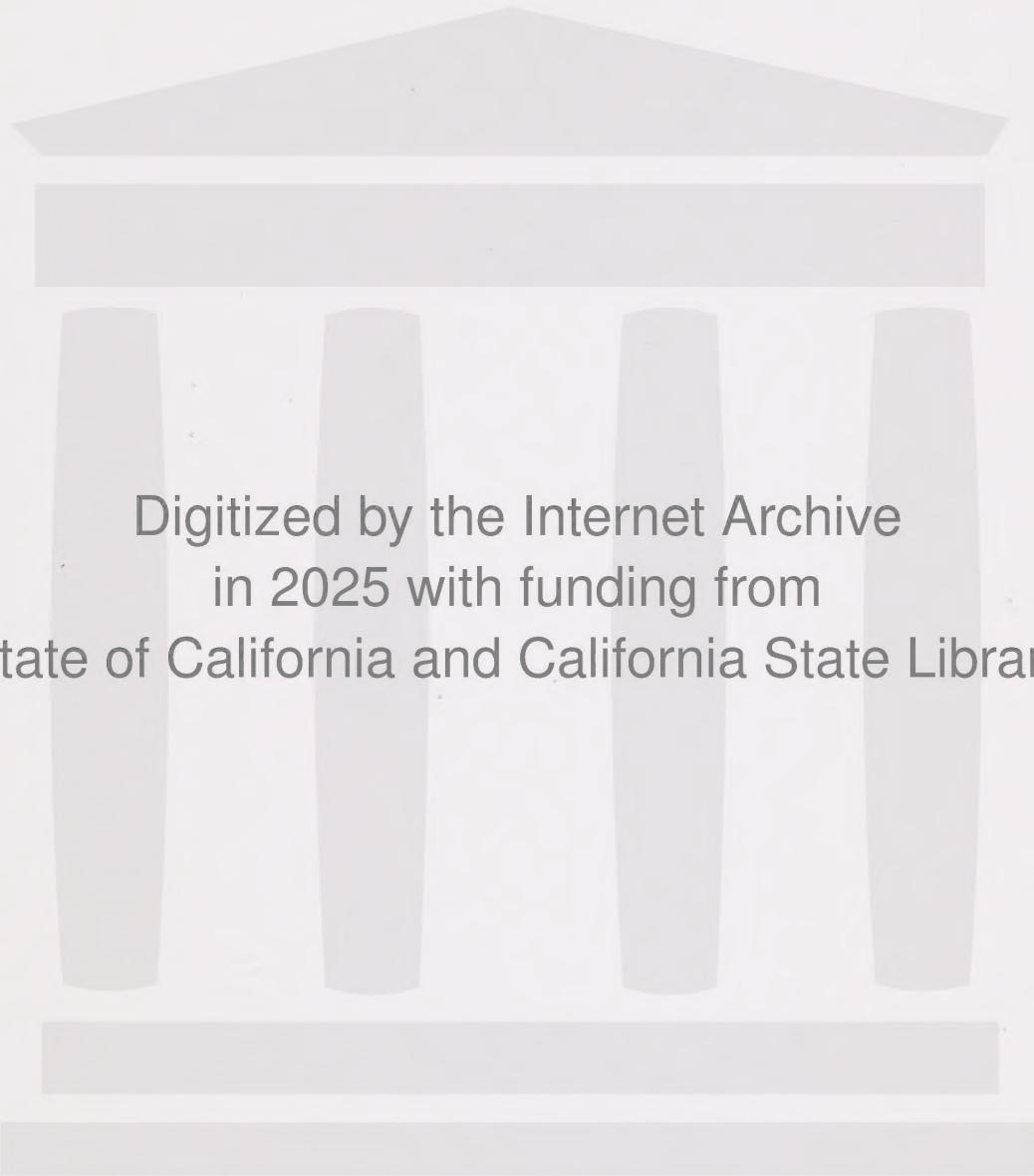


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FINAL 1991 AIR QUALITY MANAGEMENT PLAN

SOUTH COAST AIR BASIN

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**SOUTH COAST AIR QUALITY
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**SOUTHERN CALIFORNIA
ASSOCIATION OF
GOVERNMENTS**

PREFACE

The 1991 revision to the Air Quality Management Plan (AQMP) is in response to the requirements of the California Clean Air Act. This Final AQMP reflects the changes in the Draft Final AQMP (May 1991) that was adopted and authorized by the Governing Board of the South Coast Air Quality Management District on July 12, 1991.

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RESOLUTION NO. 91-23

A Resolution of the South Coast Air Quality Management District Board certifying the Final Environmental Impact Report for the Proposed 1991 Revision to the Air Quality Management Plan and adopting the Proposed 1991 Revision to the Air Quality Management Plan, to be referred to after adoption as the "1991 Air Quality Management Plan."

WHEREAS, the Air Quality Management Plan (AQMP) is the result of two years of work and eleven months of public review and debate, and has been revised in response to public comments; and

WHEREAS, the Final Environmental Impact Report (EIR) represents over one year of work, 45 days of public review, and one cycle of response to comments; and

WHEREAS, the South Coast Air Quality Management District has participated in an extensive public outreach process consisting of many workshops and public presentations on the Draft AQMP, and four public hearings prior to today's final adoption hearing; and

WHEREAS, the South Coast Air Quality Management District is committed to comply with the requirements of the California Clean Air Act (CCAA); and

WHEREAS, the South Coast Air Quality Management District Board is committed to achieving healthful air in the South Coast Air Basin (Basin) and other parts of the District at the earliest possible date; and

WHEREAS, the South Coast Air Quality Management District Board finds and determines that the Proposed 1991 Revision to the Air Quality Management Plan is considered a "project" pursuant to the terms of the California Environmental Quality Act (CEQA); and

WHEREAS, the South Coast Air Quality Management District and the Southern California Association of Governments have prepared an EIR, pursuant to CEQA, setting forth the potential environmental consequences of adopting and implementing the Proposed 1991 Air Quality Management Plan, and the EIR has received public comment to which staff has prepared responses, such that it is now a Final EIR; and

WHEREAS, the South Coast Air Quality Management District has prepared an Addendum to the EIR, pursuant to CEQA, which addresses minor modifications to the 1991 AQMP; and

WHEREAS, it is necessary that the adequacy of the Final EIR be determined by the South Coast Air Quality Management District Board prior to its certification; and

WHEREAS, it is necessary that the adequacy of responses to all comments received on the EIR be determined prior to its certification; and

WHEREAS, the provisions of Public Resources Code 21081.6 (AB 3180) - Mitigation Monitoring and Reporting - require the preparation and adoption of implementation plans for monitoring and reporting measures to mitigate adverse environmental impacts identified in environmental documents; and

WHEREAS, staff has prepared such a plan which sets forth the adverse environmental impacts, mitigation measures, methods, and procedures for monitoring and reporting mitigation measures, and agencies responsible for monitoring mitigation measures, which is included in Attachment 1 to the Resolution and incorporated herein by reference; and

WHEREAS, since the state has yet to develop guidelines pursuant to Public Resources Code 21081.6, the monitoring of responsible agencies' tasks for the purpose of this statute will be reevaluated, if appropriate, upon the adoption of state guidelines for Mitigation, Monitoring, and Reporting; and

WHEREAS, the Board of the South Coast Air Quality Management District voting on this Resolution has reviewed and considered the Final EIR, the Addendum to the Draft EIR, responses to comments on the Draft EIR, the Statement of Findings, Overriding Considerations, and the Mitigation Monitoring and Reporting Plan; and

NOW, THEREFORE, BE IT RESOLVED, that the South Coast Air Quality Management District Board declares the following statement of intent for the 1991 AQMP.

It is the obligation of all citizens, organizations, and units of government in Southern California to seek to attain the federal and state ambient air quality standards at the earliest possible date. And it is the responsibility of the South Coast Air Quality Management District to persistently lead this regional effort, and to meet the requirements set forth in the CCAA.

The control programs in the AQMP shall be based on the concepts of balanced emission reductions from all sources, equitable distribution of costs,

and retention of decision-making control at the most local level feasible. Further, the control programs adopted pursuant to the AQMP shall be designed to be consistent with the maintenance of a healthy economy, with equal job opportunity for all. Further, the District shall seek to minimize significant environmental and economic impacts associated with future rules. Whenever possible, District rules shall be promulgated in a manner which establishes emission reduction objectives rather than technological prescriptions.

In order to achieve clean air in this Basin, the AQMP has established an aggressive schedule for adoption of District rules, and local, state, and federal measures and programs. This action schedule is accompanied by emission reduction targets for future years. Through the subsequent rulemaking and local implementation efforts, each affected agency shall have the flexibility to design the details of its final rules and programs provided that said actions are consistent with the defined emission reduction targets in the AQMP. As a matter of priority, careful attention will be given to expanding the opportunities for public participation during the implementation of the AQMP.

Additionally, the South Coast Air Quality Management District Board is committed to accomplish firm, even-handed, effective enforcement of all rules and regulations of the District.

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District Board makes the following findings, based upon the record in this proceeding:

1. That state and federal health-based ambient air quality standards for carbon monoxide, nitrogen dioxide, ozone, and PM₁₀ (fine particulate) are regularly and significantly exceeded in the Basin.
2. That exceedances of those state and federal ambient air quality standards cause impairment of health in the Basin.
3. That exceedances of those state and federal ambient air quality standards reduce the quality of life in the Basin in numerous respects.
4. That the requirements set forth in the CCAA have been met.
5. That this Plan includes every feasible measure and an expeditious adoption schedule, but nevertheless the District is unable to achieve at least a 5% annual reduction in Districtwide emissions for each year covered by the Plan.
6. That the District is unable to specify an attainment date for state ambient air quality standards for ozone and PM₁₀, however, the Plan contains every feasible control strategy and measure to ensure progress toward attainment. The Plan will be reviewed and revised to ensure that progress towards attainment of all standards is maintained.
7. That this Plan is a cost-effective strategy to achieve attainment of the state standards by the earliest practicable date.
8. That the federal Clean Air Act (42 U.S.C. 7401, et seq.) requires the Basin to attain the federal primary ambient air quality standards for ozone by 2010.
9. That the federal Clean Air Act (42 U.S.C. 7401, et seq.) requires the Basin to attain the federal ambient air quality standard for PM₁₀ by 2001, with provisions for one 5-year extension.
10. That the federal Clean Air Act (42 U.S.C. 7401, et seq.) requires the Basin to attain the federal ambient air quality standards for CO and NO₂ by 2000.
11. That the Plan satisfies all the attainment deadlines for federal primary ambient air quality standards.
12. That California Health and Safety Code Section 40463 requires a formal review of the AQMP every two years, and the California Clean Air Act, Health and Safety Code 40925(a), requires a review of the AQMP at least once every three years.
13. The California Clean Air Act requires that the South Coast Air Quality Management District endeavor to achieve and maintain the state ambient air quality standards by the earliest practicable date,

and that this Plan is designed to achieve and maintain the state standards by the earliest practicable date.

14. That the South Coast Air Quality Management District Board seeks to sustain a local determination over the manner of achieving the state and federal ambient air quality standards, and to adopt and implement a Plan which will result in attaining state and federal ambient air quality standards as expeditiously as possible.
15. That the Southern California Association of Governments has prepared and approved the Growth Forecast and the Land Use and Transportation control measures, has certified environmental impact reports for the Growth Management Plan and Regional Mobility Plan, and has adopted the Growth Management Plan and Regional Mobility Plan.
16. That the Final 1991 AQMP, as adopted pursuant to this Resolution, consists of the document entitled Draft Final 1991 Air Quality Management Plan (dated May 1991), Proposed Modifications to the Draft 1991 Air Quality Management Plan, Response to Comments on the Draft 1991 Air Quality Management Plan, Proposed Corrections to the Draft Final 1991 Air Quality Management Plan, Draft Final Socio-Economic Report for the 1991 Air Quality Management Plan (dated May 1991), and all appendices and technical reports listed in Attachment 2 to the Resolution, and the Statement of Findings, Overriding Considerations and Mitigation Monitoring Plan incorporated as Attachment 1 to the Resolution hereto.
17. That the Final 1991 AQMP adopted pursuant to this Resolution, provides for the attainment of all federal ambient air quality standards by the year 2010.
18. That alternatives to the Final 1991 AQMP have been proposed and evaluated, but none of the alternatives result in attaining all federal ambient air quality standards and state requirements in the most expeditious manner, as required by state and federal law. Furthermore, project alternatives were also rejected because they either did not achieve the project objectives or they generated a greater number of adverse environmental impacts or more significant adverse impacts.

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District Governing Board certifies that the Final EIR for the 1991 Revision to the Air Quality Management Plan, which consist of the following documents, has been completed in compliance with the requirements of CEQA:

1. Notice of Preparation of a Draft Environmental Impact Report For: 1991 Revision to the Air Quality Management Plan;
2. Final Draft Environmental Impact Report For 1991 Revision to the Air Quality Management Plan (State Clearinghouse No. 90010869), including comments received on the Notice of Preparation and responses to these comments;
3. Addendum to the Final Draft Environmental Impact Report For 1991 Revision to the Air Quality Management Plan, including responses to comments on the Final Draft Environmental Impact Report; and,
4. Statements of Findings and Overriding Considerations and Mitigation Monitoring Plan.

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District Governing Board finds that adoption of the 1991 Air Quality Management Plan will result in some adverse impacts on the environment, but that all impacts but one are either insignificant or will be mitigated to insignificance through mitigation measures incorporated into the project and adopted in Attachment 1 to the Resolution. There is no feasible alternative or mitigation measure that can reduce the remaining significant impact to insignificance since all feasible mitigations have been adopted and any other alternative which would avoid this impact would not achieve the project goals of attaining state ambient air quality standards by the earliest practicable date. The District hereby adopts findings with supporting statements of fact for each significant effect, as set forth in Attachment 1 to the Resolution, attached hereto and incorporated herein by reference;

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District Board, pursuant to the requirements of 14 California Code of Regulations, Section 15093, hereby adopts the Statement of Findings and Overriding Considerations, contained in Attachment 1 to the Resolution, attached hereto and previously incorporated by reference;

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District Board hereby adopts the Mitigation Monitoring and Reporting Plan, as required by Public Resources Code, Section 21081.6, as set forth in Attachment 1 to the Resolution, attached hereto and incorporated herein by reference.

BE IT FURTHER RESOLVED, staff will submit to the Governing Board, for its consideration, recommendations for membership and a work program for the Transportation Control Measure Advisory Working Group (AWG), and the AWG shall report its findings to the Governing Board and the SCAG Executive Committee by July 1, 1992.

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District commits to improving the assessments of impacts on travel and emissions of the transportation and land-use control measures, re-analysis of the carbon monoxide attainment demonstration and further enhancing air quality modeling in the next AQMP revision, and to consider and incorporate as appropriate, Air Resources Board's recommendations on stationary, transportation and mobile source control measures as they are developed into rules.

BE IT FURTHER RESOLVED, that staff will determine, based on the findings from energy conservation studies, whether or not energy conservation targets in the AQMP need to be revised, and bring a proposed plan amendment back to the Board if the results of the studies show the targets should be revised.

BE IT FURTHER RESOLVED, the District, in the rule development process for trip reduction for schools and non-work trip reduction, will be sensitive to the impacts of those measures on working parents, students, and low-income families.

BE IT FURTHER RESOLVED, that staff prepare a study with regard to the impact of the 1991 AQMP on small business, ethnic communities and low-income families, and include the impacts on small business in the Socioeconomic Report for each rule that comes before the Board.

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District will work with all affected parties including Publicly-Owned Treatment Works, Regional Water Quality Boards, and the Southern California Association of Governments to develop an updated conformity review process for Board consideration and approval as soon as possible.

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District Board hereby accepts and incorporates into the AQMP, the AQMP elements approved and submitted by the Southern California Association of Governments, and adopts the 1991 Air Quality Management Plan, consisting of the elements submitted by the Southern California Association of Governments, as amended by its Executive Committee on June 6, 1991, the Draft Final 1991 Air Quality Management Plan (dated May, 1991) as amended by the final changes to the AQMP set forth in the Draft 1991 Air Quality Management Plan (dated December 1990), Proposed Modifications to the Draft 1991 Air Quality Management Plan, Response to Comments on the Draft 1991 Air Quality Management Plan, Proposed Corrections to the Draft Final 1991 Air Quality Management Plan, Draft Final Socio-Economic Report for 1991 Air Quality Management Plan (dated

May 1991), the Statement of Findings, Overriding Considerations and the Mitigation Monitoring Plan, and all appendices and technical reports listed in Attachment 2 to the Resolution.

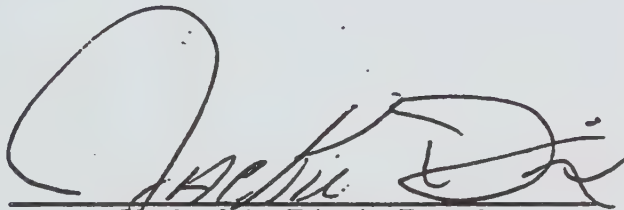
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NOES: Antonovich

ABSENT: Schiller

Dated: 7-12-91



Clerk of the District Board

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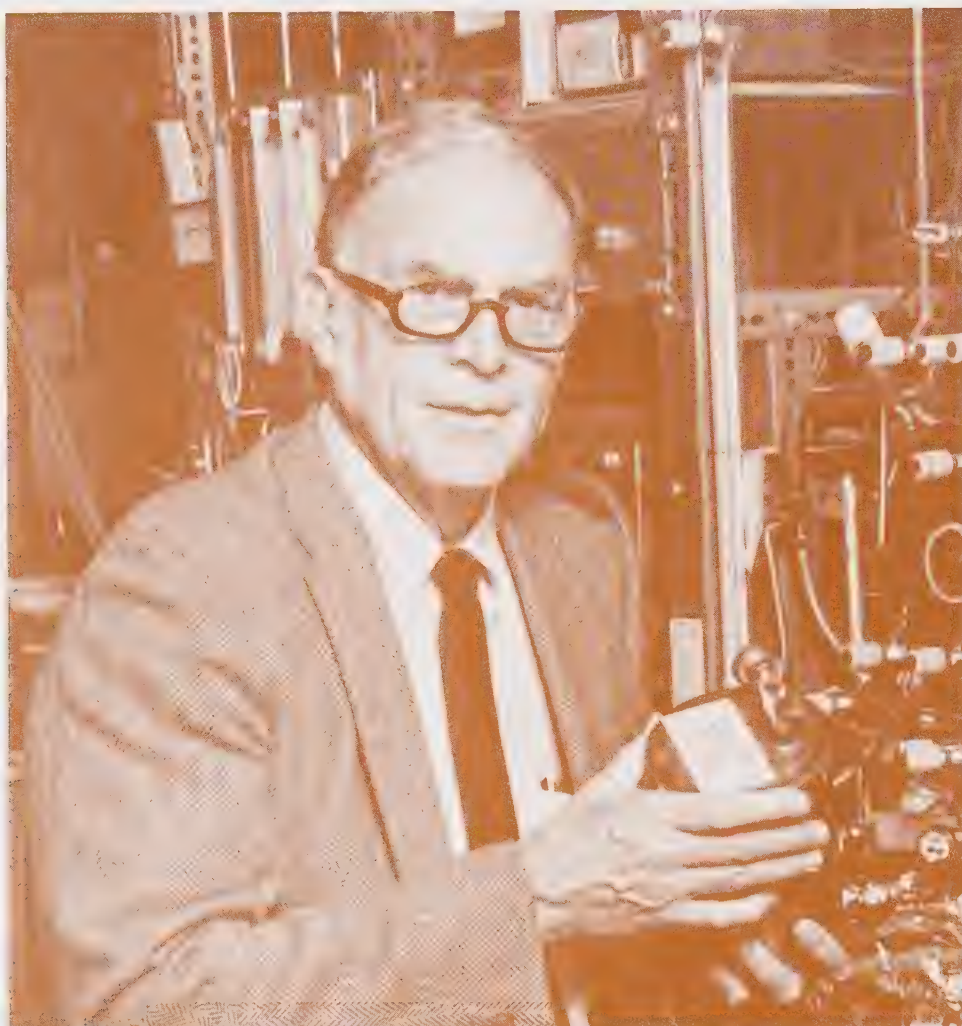
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EXECUTIVE SUMMARY





Professor F. Sherwood Rowland, Department of Chemistry, University of California at Irvine

Discovering Danger at New Heights

In 1974 Professor F. Sherwood Rowland and Dr. Mario Molina of his research team made a startling discovery: chlorofluorocarbons (CFCs), formerly presumed harmless, were destroying the planet's stratospheric ozone layer.

Rowland and Molina's work revolutionized our thinking. On a global level, the Montreal Protocol committed member nations to phase out the use of CFCs by the end of the nineties. On a local level, the AQMD now considers the impact of all proposed regulations on ozone depletion.

EXECUTIVE SUMMARY

INTRODUCTION

In March of 1989, the South Coast Air Quality Management District (District) and the Southern California Association of Governments (SCAG) adopted an Air Quality Management Plan (AQMP or Plan) designed to achieve the National Ambient Air Quality Standards. The act of adoption culminated five years of work. The Plan laid out the most aggressive schedule for new rules seen in the history of air pollution control in Southern California. All sources were addressed and all were asked to do their part to lower emissions.

At the same time that this effort was underway in the South Coast Air Basin (Basin), the California Legislature passed the California Clean Air Act (CCAA). The CCAA requires all nonattainment air basins in the state to develop new attainment plans to meet federal and state air quality standards. In addition, the CCAA places a number of performance tests before each Plan. The deadline for the adoption of a CCAA Plan for Southern California is July 1, 1991. Although the 1989 AQMP is a federal attainment Plan, the CCAA caused the District and SCAG to immediately begin updating the Plan.

In tandem, both the Air Resources Board (ARB) and the District were also busy adopting the first wave of new regulations called for under the 1989 Plan. The last year and a half has witnessed significant regulatory achievements in reducing emissions from mobile and stationary sources and consumer products.

The 1991 AQMP is built on the 1989 Plan. It is designed to achieve all state and federal requirements, and more. Specifically, this Plan demonstrates the attainment of all federal air quality standards, responds positively to CCAA performance tests, deals with the global climate change issue, addresses the stratospheric ozone depletion problem, and evaluates the problem of air toxics.

The 1991 AQMP proposes to achieve the goals set forth by implementing the following control concepts:

- o Extensive use of clean fuels,
- o Rapid introduction of clean vehicles,
- o Conserving natural gas and electricity,
- o Reducing emissions from all sources, and
- o Reducing vehicle miles travelled and trips taken.

Each of these issues is described in detail in the 1991 AQMP.

The purpose of this Executive Summary is to highlight the components of the new Plan and to respond to the basic question of "What's new?" Fifteen of the most important questions about the 1991 AQMP are answered herein.

1. HOW IS THE PLAN ORGANIZED AND WHAT NEW ISSUES ARE ADDRESSED?

The 1991 Plan follows the structure of the 1989 Plan. There are three tiers of control measures. Tier I represents known technology. There are 135 control measures in this tier, 54 of which are new. All Tier I measures are scheduled for adoption by 1996. Tier II measures represent significant advancements in today's technology. Tier III calls for the development of new technology.

The Plan is designed to respond to the requirements of the CCAA. In addition, the Plan has been expanded to include winter/summer emission "planning inventories" as well as the issues of: Air Toxics, Global Warming, and Ozone Depletion (Figure ES-1).



FIGURE ES-1
1991 Air Quality Management Plan

2. WHAT DATA ITEMS WERE UPDATED AND DID THE TOTAL INVENTORY SIGNIFICANTLY CHANGE?

The 1989 Plan was based on a 1985 emissions inventory. The CCAA requires the use of a 1987 inventory. Emissions were updated for all sources. Special attention was given to improving emission estimates for on-road motor vehicles, trains, airplanes, and vegetative sources (Figure ES-2). Population, job, and trip forecasts were also updated to a minor extent.

The updating process did not significantly change the total inventory or affect attainment strategies. Table ES-1 compares the year 2010 baseline inventory for the 1989 and 1991 Plans. It is important to note that emissions from federally regulated sources are documented with greater precision in this Plan.

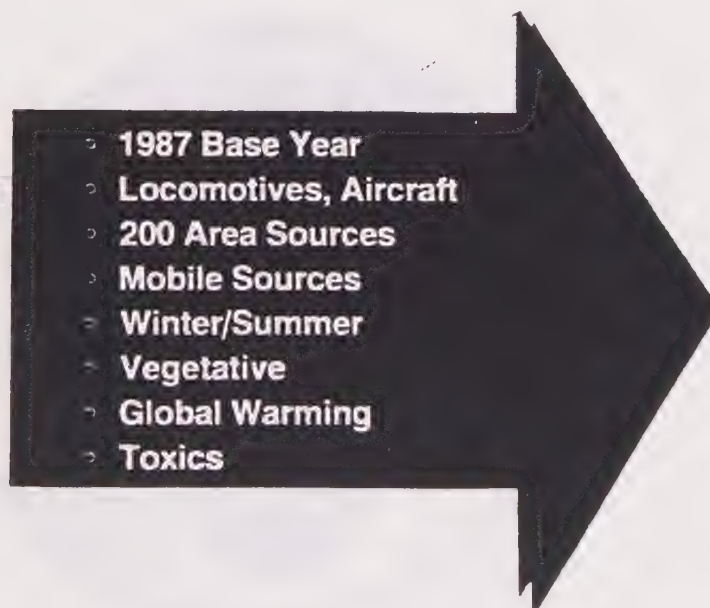


FIGURE ES-2
Inventory Enhancements

TABLE ES-1
Comparison of Year 2010 Baseline Emissions
Inventory Between 1989 and 1991 Plans
(tons/day)

Source Category	1989 AQMP			1991 AQMP		
	ROG	NO _x	CO	ROG	NO _x	CO
Stationary	699	271	205	659	203	135
Mobile	431	746	4,262	406	794	2,583
Total	1,130	1,017	4,467	1,065	997	2,718*

*Reductions due to recently adopted regulations by the ARB.

3. HOW WAS THE MODELING IMPROVED?

The ozone modeling for the 1991 Plan is three times more extensive than that accomplished for the 1989 AQMP. The 1989 modeling was based on one meteorological episode and the associated emissions inventory. The 1991 modeling is based on three meteorological episodes and their respective emissions inventories.

In addition, the ozone modeling was refined on four other fronts. First, an extensive wind field and mixing height modeling technique was developed to improve the model's input accuracy. Second, the Regional Human Exposure (RHEX) model used to estimate population health exposure was refined to "communicate" with the ozone model output. Third, the boundary and initial conditions were refined to improve model performance. Fourth, biogenic natural emissions were included in the model evaluation analysis (Figure ES-3).

The PM₁₀ and visibility modeling analyses have also been improved to use an enhanced source chemical composition library and a rigorous model performance evaluation.

Three conclusions are important to note from the improved modeling:

- o the analysis reinforces the strategy of simultaneously reducing all criteria pollutants in order to achieve all federal standards,
- o the results of the improved modeling analysis reaffirm the magnitude of emission reductions required to achieve the standards, and
- o the winter and summer analyses support the continued use of year-round emission controls as the principal basis for the regulatory programs and for establishing the rule adoption schedules.



FIGURE ES-3
Ozone Modeling Improvements

4. HAS THE OVERALL STRATEGY, OR TARGETS FOR REDUCTION FROM MAJOR SOURCES, SIGNIFICANTLY CHANGED?

No. The basic overall strategy for attainment remains the same. Some new measures are presented. Some Tier II and III measures have been moved up into Tier I. In addition, the use of market incentives is presented for consideration in certain cases. But, the core of the Plan is the same.

The emission reduction targets from major source categories are also generally the same. In addition, the targets continue to represent the maximum amount of emission control that is potentially feasible.

Relative to on-road vehicles, the last two years have seen significant technological breakthroughs for automotive emission control and cleaner fuel. The state's new motor vehicle control regulations will result in cars that are approximately 80 percent cleaner in 2003 than new cars sold in 1990. The 1991 Plan takes advantage of the adopted regulations and uses them as a foundation. Additionally, regulations more stringent than those adopted by the ARB are called for in this Plan. As an example, the ARB regulation calls for 10 percent of new vehicles sold to be electric-powered by 2003. The Plan accelerates this penetration by requiring 50 percent of new vehicles sold to be electric-powered by 2010. Vehicle miles travelled and the percent of new vehicle sales are shown in Tables ES-2A and ES-2B, respectively.

Since the release of the Draft 1991 AQMP, several changes have been made to the control measures. These changes are based on comments made during the public review period and additional information available after the release of the Draft AQMP. With respect to stationary sources, three new control measures have been added; "Marketable Permit Program", "Control of Emissions from Active Draining of Liquid Products", and "Further Control of Emissions from Internal Combustion Engines".

With respect to mobile sources, significant modifications have been made to three control measures; "Motor Vehicle Buyback Program" (formerly called "Accelerate Fleet Turnover", this control measure now includes emission reduction credits), "Inspection and Maintenance Program Enhancements" (formerly called "Loaded Mode I/M Emissions Testing", this measure has been expanded to include other I/M enhancements), and "Zero-Emission

Urban Bus Implementation" (formerly called "Urban Bus System Electrification", this measure has been modified to be fuel neutral and zero emissions). Also, the "Wastewater Conformity" measure has been deleted because it is sufficiently addressed in Regulation XIII.

In addition to the control measures, three additional contingency measures have been added to the 1991 AQMP. These contingency measures are "More Stringent Emission Standards for Federal Vehicles", "Emission Charges of \$5,000 per Ton of ROG for Stationary Sources Emitting Over 10 Tons per Year", and "Zero-Emission Vehicle Monitoring and Commercialization". All of the contingency measures are presented in the new appendix IV-G.

TABLE ES-2A
Motor Vehicle VMT Penetration Assumptions for 2010
 (percent of all miles driven)

Vehicle Class	Electric	Alternate Fuels *	Gasoline	Diesel
Passenger Cars	17	33	50	0
Light-Duty Vehicles	9	38	53	0
Medium-Duty Vehicles	0	40	57	3
Heavy-Duty Vehicles	0	24	29	47
Urban Buses	30	70	0	0
Locomotives	90	0	0	10

* Alternative fuels under consideration include methanol, LPG, and natural gas.

TABLE ES-2B
Estimated Percent of New Vehicle Sales for 2010

Vehicle Class	Electric *	Alternate Fuels **	Gasoline	Diesel
Passenger Cars	50	25	25	0
Light-Duty Vehicles	35	32.5	32.5	0
Medium-Duty Vehicles	0	50	50	-
Heavy-Duty Vehicles	0	50	50	-
Urban Buses	30	70	0	0

* Includes dedicated electric and hybrid electric vehicles.

** Alternative fuels under consideration include methanol, LPG, and natural gas.

5. THE CCAA REQUIRES A LISTING OF CONTROL MEASURES IN ORDER OF THEIR COST-EFFECTIVENESS AND A FINAL RANKING BY SPECIFIED CRITERIA. DID THIS REQUIREMENT RESULT IN A DIFFERENT CONTROL MEASURE ADOPTION SCHEDULE FOR FUTURE RULES?

Yes. The overall scheduling of control measures for rule adoption has been modified to reflect the ranking determined by nine criteria (Table ES-3). Thus, adoption dates have been moved forward or backwards for some of the carry-over measures from the 1989 AQMP. This ranking differs significantly from that based solely on cost-effectiveness, but more closely reflects the emission reduction performance standards specified in the CCAA. A listing of the control measures by cost-effectiveness is provided in the Plan.

TABLE ES-3

Criteria for Evaluating 1991 AQMP Control Measures

<u>Criteria</u>	<u>Description</u>
Cost-Effectiveness	The cost of a control measure to reduce air pollution by 1 ton (cost covers obtaining, installing and operating the control measure).
Efficiency	The positive effects of a control measure compared to its negative effects.
Emission Reduction Potential	The total amount of pollution that a control measure can actually reduce.
Enforceability	The ability to force polluters to comply with a control measure.
Equity	The fairness of the distribution of all the positive and negative effects among the various socioeconomic groups.
Legal Authority	The possibility that local governments and agencies will cooperate to approve a control measure.

TABLE ES-3 (Continued)
Criteria for Evaluating 1991 AQMP Control Measures

<u>Criteria</u>	<u>Description</u>
Public Acceptability	The support the public gives to a control measure.
Rate of Emission Reduction	The time it will take for a control measure to reduce air pollution.
Technological Feasibility	The likelihood that the technology for a control measure will be available as anticipated.

6. DOES THE PLAN MEET THE POPULATION EXPOSURE REDUCTION TARGETS IN THE CCAA?

Yes. The Plan exceeds the state requirements. The CCAA requires per capita exposure to unhealthful pollutant levels to be reduced by 25 percent in 1994, 40 percent in 1997, and 50 percent in 2000. The Plan's measures will exceed these targets for ozone, carbon monoxide, and nitrogen dioxide (Figure ES-4). PM10 is not included because it is not subject to the CCAA population exposure reduction targets.

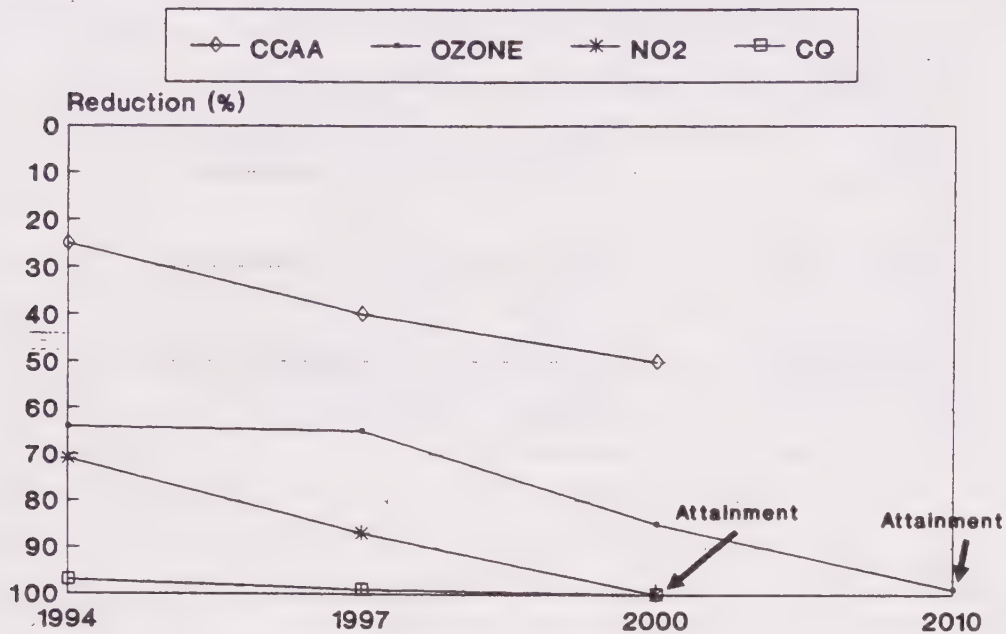


FIGURE ES-4
1991 AQMP Population Exposure Levels

7. WILL THE PLAN RESULT IN A FIVE PERCENT PER YEAR REDUCTION OF EMISSIONS BY 1994, 1997, AND 2000?

No. The Plan meets the CCAA alternate requirement of reducing emissions to the "maximum extent feasible," but only achieves some of the emission reduction targets relative to ozone, nitrogen dioxide, and carbon monoxide.

Almost all of the regulations adopted by the ARB and the District include a phased-in transition time for the regulated industry. In addition, many of the regulations are also based on a stair-stepped approach that spans a number of years. Although the options to improve the Plan's performance in the early years are limited, additional options for near-term emission reductions through measures that affect near-term emissions (such as reformulated gasoline and SMOG CHECK improvements) will be sought to remedy these shortfalls in the future Plan revisions.

The order of adoption of the measures in the Plan has been arranged to maximize the emission reductions and to come as close as possible to achieving the five percent per year target. However, a full five percent per year reduction from all sources would equal zero emissions in 20 years. Accordingly, the annual slope of descent to attainment is closer to four percent per year for this Basin. The Plan generally follows this rate of descent. Figure ES-5 illustrates this point for ROG emissions.

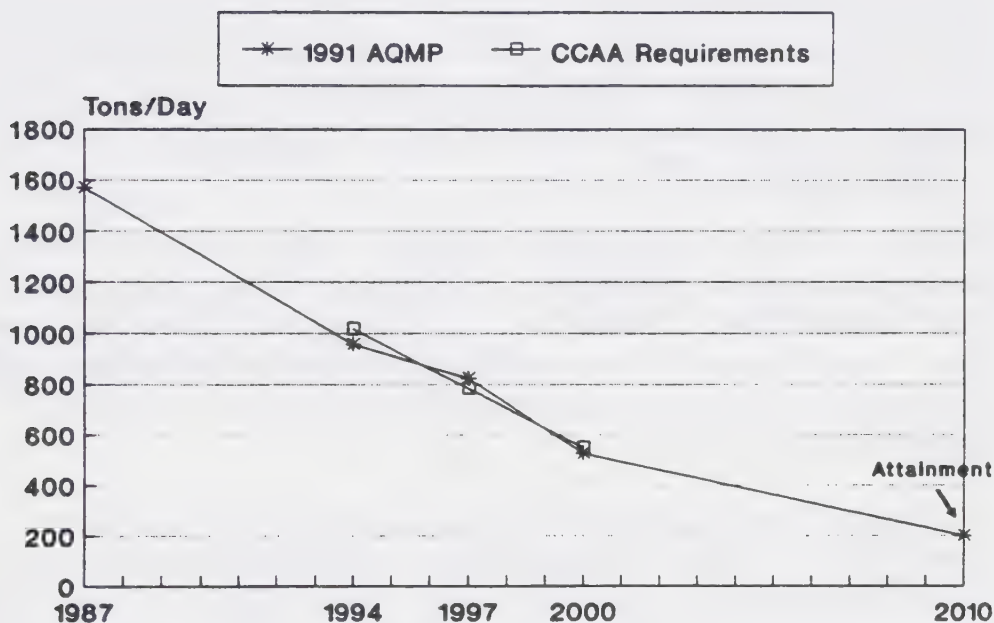


FIGURE ES - 5

1991 AQMP ROG Emission Reductions
for the Planning Inventory

8. HAS THE ROLE OF LOCAL GOVERNMENT CHANGED? AND WHAT KIND OF INDIRECT SOURCE RULES ARE PROPOSED?

SCAG's land use and transportation measures remain basically the same as in the 1989 Plan. However, SCAG's energy conservation measures have been revised and included in Appendix IV-D "Energy Analysis for Control Strategies" which was prepared by the District, SCAG, and the California Energy Commission (CEC) with assistance by the California Public Utilities Commission (PUC) and the ARB. In addition, the Growth Management measure has been revised to focus on the reduction of vehicle miles traveled (VMT) equivalent to the previous job/housing balance performance goals. A number of market incentive strategies are also presented which are designed to provide economic incentives for meeting the objectives of individual measures.

Overall, the local government measures reflect the 1989 Plan, the recommendations of the Growth Management and Transportation Task Force, and the input of numerous local governments. These measures rely upon a combination of market incentives, local ordinances and regional regulations to meet their emission reduction objectives. Most call for local government action by 1994.

A number of Indirect Source Rules are proposed for District action. Local government "certification" is suggested as an approach for most of the future Indirect Source Rules. Under this concept, the District would adopt a model rule with a delay period prior to implementation. During this window, local governments that adopt a comparable regulation would be "certified" to implement the rule.

9. WHAT ARE THE ENERGY IMPACTS OF THE PLAN?

The 1989 Plan raised a number of questions about future energy demand and the role of conservation. In order to address these questions, an Energy Working Group was formed. The Group consists of the District, ARB, CEC, PUC, and SCAG. In addition, all of the affected utilities were represented on technical subcommittees. The end result in the 1991 Plan is a much higher level of consensus on energy impacts.

The 1991 Plan represents a decrease in peak electricity demand of about 3,400 megawatts (MW) by 2010 from the baseline forecast of 34,200 MW, which is 65 percent higher than the 1987 demand, due to growth (Table ES-4). Natural gas demand can also be reduced up to 171 billion cubic feet by 2010 from the baseline forecast of 1,327 billion cubic feet, which is 50 percent higher than the 1987 demand (Table ES-5). The electric energy conservation target for the residential and commercial sectors is 15 percent for each sector and 5 percent for the industrial sector. The natural gas conservation target for the residential and commercial sectors is 20 percent. The industrial sector was not analyzed.

TABLE ES-4
Summary of Electricity Impacts
1991 AQMP

Electric Energy	1987		2000(a)		2010(a)	
	GWh	MW	GWh(%)	MW(%)	GWh(%)	MW(%)
Baseline Forecast	97,800	20,700	132,000(100)	29,800(100)	149,000(100)	34,200(100)
Scenario Changes:						
Energy Conservation			-13,700(-10)	-3,400(-11)	-16,800(-11)	-4,200(-12)
Stationary Controls			-150(0)	+50(0)	+2,400(+2)	+560(+2)
Motor Vehicle Fuels			1,700(+1)	+90(0)	+6,900(+5)	+270(+1)
Combined Impacts			-12,200(-9)	-3,250(-11)	-7,500(-5)	-3,400(-10)

(a) Actual forecast years: 2001 and 2009.

TABLE ES-5
Summary of Natural Gas Impacts
1991 AQMP
(Billion Cubic Feet per Year)

	1987	2000	(% Diff)	2010	(% Diff)
Baseline Forecast	871	1235		1327	
<u>Scenario Changes</u>					
Demand-Side Management ^(a)		-50	-4	-84	-6
Stationary Controls		-52	-4	-37	-3
Motor Vehicles ^(b)		-6 to +28	0 to +2	-82 to +112	-6 to +8
Combined Effect		-108 to -74	-8 to -6	-145 to +48	-11 to +4

(a) Reflects conservation goals of 15 percent and 20 percent for the years 2000 and 2010, respectively, for the residential and commercial sectors.

(b) Decrease in demand is due to CEC's assumption that natural gas demand in the utility electric generation sector will be curtailed in order to meet the CNG requirement.

10. HAS THE ATTAINMENT PROJECTION CHANGED FOR FEDERAL OR STATE STANDARDS?

Yes. There has been a change to the attainment projection for the federal PM₁₀ standard (Figure ES-6). The revised estimate is the direct result of improvements in emissions estimates and air quality modeling capabilities.

The 1991 AQMP also provides estimates for attainment of state standards, whereas the 1989 AQMP did not provide such estimates. The state standards for CO, NO₂, SO₂, and sulfate standards will be achieved through the three-tier control approach. However, the state ozone and PM₁₀ standards will not be attained even with full implementation of the 1991 AQMP. Future revisions to the Plan will seek to identify additional measures so that these standards can be attained.

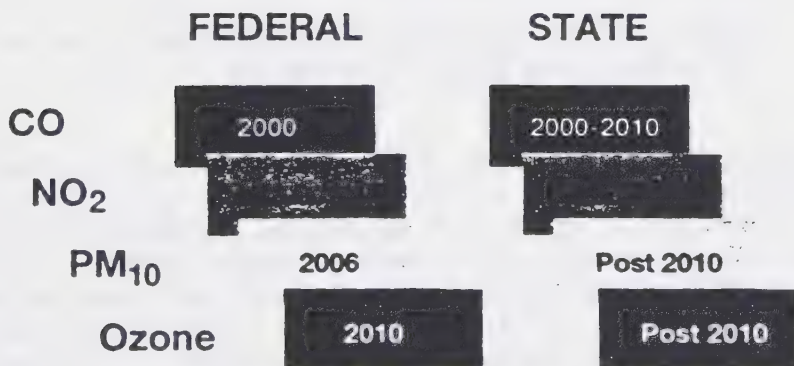


FIGURE ES-6
Target Attainment Dates

11. ARE MARKET INCENTIVE-BASED STRATEGIES INCLUDED IN THE PLAN?

Yes. The air pollution challenge in Southern California needs to be supported with every possible type of emission-reduction tool. The success of source-specific regulations is proven. Market incentives can complement the existing regulatory system. The goal is clean air, at the lowest possible cost.

The 1991 AQMP contains a number of market incentive measures. A few major concepts currently under development are outlined below.

- o Evaluate the use of the District's existing Emission Fee System to increase incentives for emission reductions.
- o Investigate the concept of emission reduction credits and offsets for indirect sources.
- o Evaluate the use of toll roads, and other mechanisms such as congestion fees to increase vehicle occupancy rates and to divert trips to other modes of travel.
- o Consider emission fees for higher pollution engines to encourage clean fleet turnover.
- o Address the need to develop effective market incentives to improve balanced growth in the region.

The most significant work to date is the current efforts to develop the marketable permit program for permitted stationary sources. The program represents a significant departure from the current regulatory system in that the emissions would be available for trading between sources. Essentially, each source would be given a specific emissions reduction target that must be met for a prescribed period. The actual method of compliance would be left up to the individual firm including purchase, trading and sale of emissions, installation of control equipment and restriction in output or production.

This program promises to be an important tool for the District to achieve significant emissions reduction in a flexible manner while continuing to make progress toward clean air standards. District staff is expected to develop recommendations for Board consideration in early 1992.

12. DOES THE PLAN MEET ALL REQUIREMENTS OF THE 1990 FEDERAL CLEAN AIR ACT AMENDMENTS?

No. Although the Federal Clean Air Act (CAA), adopted November 15, 1990, is generally less stringent than the CCAA, it does establish some unique requirements. Specifically, it contains amendments that are pertinent to control measure requirements. These amendments will be considered and incorporated into the first future Plan amendment under the 1990 CAA. These amendments cannot be incorporated until the Environmental Protection Agency (EPA) issues its guidance on the recent changes, which will not be available until November 1991. That is much later than the adoption date for the 1991 AQMP--July 12, 1991.

13. HOW IS THE PLAN MONITORED TO MEET EMISSION REDUCTION GOALS?

As the 1991 AQMP is implemented, state and federal laws require the District to periodically assess the effectiveness of air pollution programs in reducing emissions, and determine whether or not the Basin is still proceeding along the course set forth in the Plan.

Each year, following approval of the Plan, the District will prepare a monitoring report that will summarize the Basin's progress in meeting the schedules for developing, adopting, or implementing the air pollution control measures contained in the Plan. The annual reports will provide the necessary information to adjust the ranking of control measures to achieve reductions of the five percent per year or fifteen percent over three years required by the CCAA. Every third year, the District will assess the overall effectiveness of the air pollution control program and prepare a triennial monitoring report. This report will evaluate the emission reductions achieved over the preceding three years and contrast those reductions to the assumptions and goals contained in the Plan.

The annual and triennial monitoring reports will be adopted by the District at public hearings and submitted to ARB. These reports not only track the progress of the Plan, but serve an equally important function of informing the people that live and work in the Basin of the efforts being taken to improve air quality.

14. WHAT WERE THE RESULTS OF THE ANALYSIS IN THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR 1991 THE AQMP?

As indicated previously, the 1991 Revision to the AQMP follows the structure of the 1989 AQMP Revision. The 1991 AQMP Revision, however, contains the following changes and additional components:

- o Baseline emissions data have been updated;
- o Control measures regulating toxic air contaminants have been added;
- o Control measures regulating global warming and stratospheric ozone depleting substances have been added; and
- o California Clean Air Act (CCAA) requirements have been addressed.

For these reasons, a new environmental impact report (EIR) was prepared rather than relying on the EIR for the 1989 AQMP. The 1991 AQMP EIR is considered to be a program EIR because it assesses impacts in connection with the issuance of rules, regulations, plans, or other general criteria that govern the conduct of a continuing program (CEQA Guidelines, Section 15168). The 1991 AQMP Draft EIR contains a comprehensive analysis of potential impacts that may be generated by the 1991 AQMP for all environmental areas identified in the CEQA Guidelines, approximately 20 environmental areas. These areas include: earth impacts, air quality impacts, water impacts, plant life impacts; animal life impacts; noise impacts; natural resources impacts; risk of upset impacts; population impacts; housing impacts; transportation/circulation impacts; public services impacts; energy impacts; utilities impacts; human health impacts; aesthetics impacts; recreation impacts; and cultural resources impacts.

The primary difference between the analysis of environmental impacts between the 1989 AQMP Draft EIR and the 1991 AQMP Draft EIR is that the 1989 AQMP EIR did not eliminate the influence of factors external to the AQMP itself, such as population growth or projects under the jurisdiction of other agencies such as transportation improvement projects that are scheduled to proceed regardless of whether or not the AQMP is implemented. When the influence of these external factors are removed from the analysis of impacts, conclusions regarding the significance of

environmental impacts are substantially different compared to the 1989 AQMP EIR. For all environmental areas, except water, adverse impacts that may be generated by the 1991 AQMP can be reduced to insignificance by implementing mitigation measures identified in the 1991 AQMP Draft EIR. It was concluded that, since the Basin is experiencing a fifth year of drought conditions, increased water demand impacts generated by the 1991 AQMP constitute a significant, adverse impact in spite of the mitigation measures identified.

CEQA also requires an analysis of a reasonable range of potential alternatives that could attain the goals of the proposed project with fewer or less severe environmental impacts. CEQA also requires analysis of a "No Project" alternative, that is, no action. In this case, the no project alternative (Alternative A) consists of the 1989 AQMP. All other alternatives are based upon the 1991 AQMP and consist of the following:

- o Alternative B - Cost Effectiveness: This alternative consists of all control measures contained in the 1991 AQMP, implemented according to cost with the least costly control measures being implemented first.
- o Alternative C - 1991 AQMP Plus 100 Percent Penetration of Electric Vehicles: This alternative is identical to the 1991 AQMP except that it calls for 100 percent penetration of electric vehicles, as opposed to the 17 percent penetration of electric vehicles called for in the 1991 AQMP.
- o Alternative D - 1991 AQMP Excluding the Land Use and Transportation Control Measures: This alternative would require implementation of all 1991 AQMP control measures except for the land use and transportation control measures contained in Appendix IV-E (formerly Appendix IV-G in the 1989 AQMP).

The comparison of the alternatives indicated that the 1991 AQMP was the preferred project alternative because it achieved more of the project goals than the other alternatives with fewer environmental impacts. Even Alternative B, which is essentially identical to the 1991 AQMP, did not achieve the CCAA requirement of population exposure reduction as effectively as the 1991 AQMP

The 1991 AQMP Draft EIR was circulated for a 45-day public comment period. By the end of the public comment period, the SCAQMD received 20 comment letters from the public. Responses to all comments were prepared and incorporated into the 1991 AQMP Final EIR, which also includes the Draft EIR. In addition, as a result of comments received on the 1991 AQMP itself, minor revisions to it were made. These minor revisions were assessed and it was determined that they would generate no new environmental impacts, would not exacerbate existing environmental impacts, nor would additional mitigation measures be necessary. As a result, an Addendum was prepared (pursuant to CEQA Guidelines Section 15164) and was also incorporated into the 1991 AQMP Final EIR [pursuant to CEQA Guidelines, Section 15164 (b)]. The 1991 AQMP Final EIR was certified by the SCAQMD's Governing Board on July 12, 1991.

15. WHAT WERE THE RESULTS OF THE ANALYSIS IN THE SOCIO-ECONOMIC REPORT FOR THE 1991 AQMP?

COST

The quantifiable costs of implementing the 1991 AQMP are \$1.318 billion annually, on average. These include 54 District measures for \$1.188 billion and two ARB measures of low emission vehicles for \$0.155 billion. In addition, this analysis seeks to provide a projected costs for all of the unquantified measures. These measures could add another \$3.528 billion to the costs of implementation in 2010. These costs are tenuous since the costs of future technology were estimated in terms of those of today's control technology. The total daily per capita cost of quantifiable and unquantifiable measures is \$0.84. Therefore, it will cost each person less than one dollar per day to have clean air in the Basin.

Moreover, the 24 transportation and land use control measures, developed by the Southern California Association of Governments (SCAG), will cost \$3.711 billion to implement. These measures are made up of 14 transportation control measures (TCMs) for \$1.53 billion and 10 transportation construction projects for \$2.181 billion.

BENEFIT

On average, compliance with the federal PM10 and ozone standards will bring an annual benefit of \$1.52 billion in visibility improvements, \$139 million in reduced damages to building surfaces, \$4.506 billion in improved health, and \$36 million in increased crop yields. These quantifiable benefits amount to \$6.201 billion in total. Not all the benefits associated with the implementation of the Plan can be quantified. For example, the quantifiable health benefits represent four of 80 factors of the known probable health benefits associated with the attainment of clean air. The estimated daily per capita benefit of visibility improvements, reductions in morbidity and mortality, increased crop yields, and reduced expenditures on refurbishing building surfaces collectively is \$1.10. Therefore, the individual of the South Coast Air Basin receives approximately \$1.10 in benefits.

In addition, implementation of transportation and land use measures will reduce traffic congestion for an annual benefit of at least \$1.251 billion.

EMPLOYMENT

The total quantifiable costs and benefits will result in an average additional 22,478 jobs created annually and 99,623 jobs created in 2010, relative to the baseline job growth without the 1991 AQMP. The projected costs of unquantifiable measures could affect jobs by a reduction of 80,300 in 2010. The projection of job reductions assumes that unquantified control measures will not create jobs. In total, implementation of the Plan could result in 57,822 fewer jobs created annually, on average from 1991 to 2010; and 19,323 additional jobs created in 2010.

The 24 transportation and land use measures together with their associated congestion relief benefits will result in 81,527 additional jobs created annually, on average.

I INTRODUCTION





Karen Gilbert and class from Kimbark Environmental Education Magnet School in San Bernardino County test pond for acid rain impact

Enlisting Earth's Young Stewards

Outreach efforts that enlist younger generations in the fight to protect the environment are an integral part of the South Coast Air Quality Management District's clean-air campaign.

Programs the District has designed or sponsored to raise an environmental consciousness among young people include a "Think Earth" curriculum for elementary schools, a Speakers' Bureau that conveys a pro-active message to students of all ages, a recycling exhibit at the California Museum of Science and Industry, animated public service announcements featuring "The Jetsons" fighting air pollution, newspaper supplements, movie trailers, and a poster contest that commemorated Earth Day's 20th anniversary in 1990.

CHAPTER 1

INTRODUCTION

Purpose

Constraints in Achieving Standards

Control Efforts

1989 AQMP

1991 AQMP Revision

Format of This Document

PURPOSE

The purpose of the 1991 Revision to the Air Quality Management Plan (AQMP or Plan) for the South Coast Air Basin (Basin) is to set forth a comprehensive program that will lead the Basin into compliance with all federal and state air quality standards. This goal has been set by the Governing Board of the South Coast Air Quality Management District (District) and the Executive Committee of the Southern California Association of Governments (SCAG).

The 1991 AQMP Revision sets forth programs which require the cooperation of all levels of government: local, regional, state, and federal. Each level is represented in the Plan by the appropriate agency/jurisdiction that has the authority over specific emissions sources. Accordingly, each agency/jurisdiction is assigned specific planning and implementation responsibilities.

At the local level SCAG has a dual role of leader and coordinator. In its leadership role, SCAG, in cooperation with local jurisdictions, develops transportation and land use control strategies for these jurisdictions to implement; as a coordinator, SCAG facilitates the implementation of these strategies. At the regional level, the District is responsible for stationary sources, consumer products, and some mobile and indirect sources. In addition, the District has lead responsibility for the development and adoption of the Plan. The Air Resources Board (ARB), representing the state level, oversees statewide vehicle emission standards, fuel specifications, and consumer product standards. At the federal level, the Environmental Protection Agency (EPA) is charged with regulation of the forty-nine state vehicle standards; trains, airplanes, and ships; and off-shore oil development.

Since air pollution physically transcends city and county boundaries, and thus is a regional problem, the strategies in the Plan reflect this very fact. Interagency commitment and cooperation are the keys to its success. No one agency can implement the Plan alone.

CONSTRAINTS IN ACHIEVING STANDARDS

Setting

The South Coast Air Basin (Basin) is a 6600-square-mile area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. The Basin includes all of Orange County and the nondesert portions of Los Angeles, Riverside, and San Bernardino counties.

The topography and climate of Southern California combine to make the Basin an area of high air pollution potential. During the summer months, a warm air mass frequently descends over the cool, moist marine layer produced by the interaction between the ocean's surface and the lowest layer of the atmosphere. The warm upper layer forms a cup over the cool marine layer and inhibits the pollutants in the marine layer from dispersing upward. In addition, light winds during the summer further limit ventilation. Sunlight also is needed for the photochemical reactions which produce ozone. The region experiences more days of sunlight than any other major urban area in the nation except Phoenix.

Emission Sources

Air pollution forms either directly or indirectly from pollutants emitted from a variety of sources. These sources can be natural, such as oil seeps, vegetation, or windblown dust. Emissions may also result from combustion, as in automobile engines; from evaporation of organic liquids, such as those used in coating and cleaning processes; or through abrasion, such as from tires on roadways. The air pollution control strategy in the AQMP is directed almost entirely at controlling man-made sources since they are the most easily controlled. Where naturally occurring emissions can be mitigated, such as through windbreaks, they are included. Otherwise, natural emissions are accounted for in the background and initial conditions data used for the air quality models described in Chapter 5.

The Basin's industrial base is diverse. The aerospace and electronics industries currently account for about 20 percent of the Basin's employment. Significant changes have occurred in the composition of the industrial base of the region in the past ten years. As in many other areas of the country, a large segment of heavy manufacturing, including steel and tire manufacturing and automobile assembling, has left. Small service industries and businesses resulting from growth in shipping and trade have replaced much of the heavy industry.

Population

Since the end of World War II, the Basin has experienced faster population growth than the rest of the nation. Although growth is slowing somewhat, the region's population will continue to increase significantly by 2010, as shown in Table 1-1. Projected growth is based on SCAG's adopted regional growth forecast.

TABLE 1-1
Population Growth

<u>Year</u>	<u>Population</u>	<u>Average % Increase Per Year Over Period</u>
1950	4.8 million	
		2.7%
1980	10.5 million	
		1.9%
1987	12.0 million	
		1.2%
2010	15.7 million	

Although per capita emissions have been brought down substantially in the Basin through 40 years of controls, increases in the population over that time have made substantial overall emission reductions more difficult. Many sources, such as automobiles, have been significantly controlled. However, increases in the number of sources, particularly those growing proportionately to population, reduce the potential air quality benefits of new controls. The net result is that unless dramatic steps are taken to control

air pollution--at a much faster rate than ever before--growth will overwhelm the improvements expected from the existing control program.

CONTROL EFFORTS

History

The seriousness of the local air pollution problem was recognized in the early 1940s. In 1946, the Los Angeles County Board of Supervisors established the first air pollution control district in the nation to address the problems of industrial air pollution. In the mid-1950s, California established the first state agency to control motor vehicle emissions. Countywide or regional air pollution districts were required throughout the state by 1970. Many of the controls originated in California became the basis for the federal control program which began in the 1960s.

Nearly all control programs developed to date have relied on the development and application of cleaner technology and add-on emission control devices. Sources affected by this technology have been industrial and vehicular. Only recently have efforts been directed at how emission sources are used, e.g., the Inspection and Maintenance Program, High-Occupancy-Vehicle Lanes (HOV), and mandatory maintenance procedures for industrial sources.

In the 1970s it became apparent at both the state and federal levels that local programs were not enough to solve a problem that was regional in nature and did not stay within jurisdictional boundaries. Instead, air basins, defined by geographical boundaries, became the basis for regulatory programs.

In 1976, the California Legislature adopted the Lewis Air Quality Management Act which created the South Coast Air Quality Management District from a voluntary association of air pollution control districts in Los Angeles, Orange, Riverside, and San Bernardino counties. The new agency was charged with developing uniform plans and programs for the region to attain federal standards by the dates specified in federal law. The agency was also mandated to meet state standards by the earliest date achievable, using reasonably available control measures.

Impact of Control

Past air quality programs have been effective in improving the Basin's air quality. Ozone levels have declined by almost half over the past 30 years, sulfur dioxide and lead standards have been met, and other criteria pollutant concentrations have significantly declined. However, the Basin still experiences exceedances of health-based standards for ozone, nitrogen dioxide, carbon monoxide, and particulate matter under ten microns (PM10).

1989 AQMP

The 1989 AQMP was adopted on March 17, 1989, at a joint meeting of the Governing Board of the District and the Executive Committee of SCAG. Five months later, ARB approved the Plan.

The 1989 AQMP enhanced the long-range strategy set forth in previous AQMPs. Using a three-tiered format, the plan proposed a comprehensive set of control measures that included the use of less-polluting solvents and new, more efficient application methods in a variety of operations, as well as the use of alternative fuels. Most control measures were to be adopted within several years after adoption of the Plan, while others required more time due to the need for advances or breakthroughs in technology. Implementation responsibilities were delineated between the District, ARB, EPA, and local governments depending on each agency's authority and type of control measure.

The Final 1989 AQMP refined the inventories and measures previously issued for public comment. They included projections of future air quality after imposition of controls, and costs where available. The 1989 AQMP addressed all federal and state pollutants for which standards had not yet

been attained. To meet regional attainment policies, the AQMP called for implementing all technologically available cost-effective measures, adopting procedures which maximize emission reductions, and forcing the development of new technology.

Progress in Implementing the 1989 AQMP

Progress in implementing the 1989 AQMP can be measured by the number of control measures that have been adopted as rules and the resulting tons of pollutants targeted for reduction.

Thirty-four control measures have been adopted by ARB or the District through the second quarter of 1991, producing a total emissions reduction of 239 tons per day for reactive organic gases, (compared to a target of 229) and 161 tons per day of NO_x (compared to the target of 191).

Table 1-2 lists the stationary source control measures that were adopted as rules through the second quarter of 1991. Additional rules have been adopted by the ARB to further reduce mobile source emissions.

TABLE 1-2

Control Measures Adopted Through 2nd Quarter 1991
(1989 Control Measure Numbers)

Control Measure	Title	Rule No.
ROG Rules		
A-1	Wood Flatstock Coatings	SCAQMD Rule 1104
A-2	Wood Furniture Coatings	SCAQMD Rule 1136
A-3	Can & Coil Coatings	SCAQMD Rule 1125
A-4	Aerospace Coatings	SCAQMD Rule 1124
A-6	Automobile Refinishing	SCAQMD Rule 1151
A-7	Marine Vessels Coatings	SCAQMD Rule 1106
A-8a	Architectural Coatings	SCAQMD Rule 1113
A-10	Graphic Arts	SCAQMD Rule 1130
A-12	Solvent Degreasers	SCAQMD Rule 1122
A-14	Expand Plastic-Foam Blowing	SCAQMD Rule 1175
A-15	Semiconductors Manufacturing	SCAQMD Rule 1164
A-17	Petro Solvent Dry Cleaners	SCAQMD Rule 1102
A-18	Underarm Products	ARB
A-19	Domestic Products	ARB
A-21	Adhesives	SCAQMD Rule 1168

TABLE 1-2 (Continued)

Control Measures Adopted Through 2nd Quarter 1991
(1989 Control Measure Numbers)

Control Measure	Title	Rule No.
ROG Rules		
B-3	Sumps, Pits & Separators	SCAQMD Rule 1176
B-13	Valves, Pumps, & Compressors	SCAQMD Rule 1173
C-1	Commercial Bakeries	SCAQMD Rule 1153
D-1	Starter Fluid	SCAQMD Rule 1174
D-3	Publicly Owned Treatment Works (POTWs)	SCAQMD Rule 1179
F-6	Exempt Equipment	SCAQMD Rule 219
F-7	Soil Decontamination	SCAQMD Rule 1166
F-8 ⁽¹⁾	New Source Review	SCAQMD Reg. XIII
G-5	Smoking Vehicle Enforcement	N/A
NOx Rules		
B-6	Crude Oil Pipeline Heaters	SCAQMD Rule 1146
B-14	Oil Field Steam Generators	SCAQMD Rule 1146
B-15	Refinery Heaters & Boilers	SCAQMD Rule 1109
C-2	Internal Combustion Engines	SCAQMD Rule 1110.2
C-7	Small Boilers and Heaters	SCAQMD Rule 1146.1
C-8	Industrial Boilers, Heaters, & Generators	SCAQMD Rule 1146
C-9	Gas Turbines	SCAQMD Rule 1134
C-10	Electric Power Generators & Boilers	SCAQMD Rule 1135
F-8 ⁽¹⁾	New Source Review	SCAQMD Reg. XIII
SOx Rules		
F-2	Sulfur Content-Gas Fuels	SCAQMD Rule 431.1
F-3	Sulfur Content-Liquid Fuels	SCAQMD Rule 431.2

(1) F-8 (New Source Review) reduces both ROG and NOx.

Implementation of the 1989 AQMP has occurred in other areas as well, particularly by local jurisdictions. Of the 142 jurisdictions within the Basin, 107 or 75 percent, representing 89 percent of the population, responded to a survey conducted by SCAG in August, 1990 to assess the progress made by local governments in implementing the AQMP provisions. Forty-seven percent of the responding jurisdictions have initiated a work program to implement the 1989 AQMP. Most of the jurisdictions that responded have implemented at least one of the AQMP measures slated for local government action. Table 1-3 summarizes local government implementation actions, by control measure, as contained in the Reasonable Further Progress (RFP) report prepared by SCAG and presented to the ARB in October, 1990.

TABLE 1-3
Number of Jurisdictions Implementing Transportation,
Land Use, and Energy AQMP Control Measures
(1989 Control Measure Numbers)

Control Measure Number	Title	Have Been Implementing	Action Pending	No Action Taken
TRANSPORTATION				
1.a.	Alternative Work Weeks and Flextime	40	20	36
1.b.	Telecommunications	9	18	60
2.a.	Employer Rideshare & Transit Incentives	30	21	42
2.b.	Parking Management	8	23	55
2.c.	Vanpool Purchase Incentives	3	15	68
2.d.	Merchant Transportation Incentives	7	11	64
2.e.	Auto Use Restrictions	2	12	68
2.g.	Transit Improvements	27	18	41

TABLE 1-3 (Continued)

Number of Jurisdictions Implementing Transportation,
Land Use, and Energy AQMP Control Measures
(1989 Control Measure Numbers)

Control Measure Number	Title	Have Been Implementing	Action Pending	No Action Taken
3.a	Truck Dispatching, Rescheduling & Rerouting	3	17	66
4	Traffic Flow Improvements	39	21	27
5	Nonrecurrent Congestion	10	11	60
15	Electric Vehicles	1	15	72
G-4	Clean Fuels in New Fleet Vehicles	5	13	63
LAND USE				
17	Growth Management	11	30	45
PARTICULATE AND BUILDING EMISSIONS				
12.a	Paved Roads	24	12	50
F-4	Fugitive Emissions from Construction of Roads & Buildings	24	11	49
12.b	Unpaved Roads and Parking Lots	26	12	58
E-3	Fugitive Dust from Agriculture	6	7	62
F-9	Low-Emission Materials, Building Construction	8	10	65

TABLE 1-3 (Continued)
**Number of Jurisdictions Implementing Transportation,
 Land Use, and Energy AQMP Control Measures
 (1989 Control Measure Numbers)**

Control Measure Number	Title	Have Been Implementing	Action Pending	No Action Taken
18.a	Local Government Energy Conservation	17	9	53
18.c	Pricing, tax and Subsidy Incentives	5	5	73
D-4	Emissions from Swimming Pool Water Heating	3	9	71
D-5	Emissions from Residential and Commercial Water Heating	3	9	71
18.b	Waste Recycling	24	27	30

1991 AQMP REVISION

The 1991 AQMP addresses CCAA requirements, retains the basic structure of the 1989 AQMP, but also contains several enhancements to the emissions inventory and modeling analyses, and includes improved mobile source strategies. The expanded emissions inventory includes greenhouse gases and biogenic emissions, and adds emissions from the Coachella Valley to the data base. Modeling enhancements increase the certainty in predicting future air quality with and without controls. Moreover, mobile source strategies are greatly improved due to recently adopted statewide vehicle emission standards.

The 1991 AQMP also reflects the work of several interagency working groups that were established upon the adoption of the 1989 AQMP. These groups provided technical input on energy conservation measures and energy-related issues, application of modeling approaches and evaluation of modeling performance, as well as methods of monitoring implementation of the Plan. The 1991 AQMP also reflects the input of two task forces that considered socioeconomic and public health issues, as well as growth management and transportation issues.

Relation to Adjacent Air Basins

The South Coast Air Basin's pollution affects adjacent air basins through transport of air pollutants downwind. The downwind areas affected are the Antelope Valley and Coachella Valley, both in the Southeast Desert Air Basin, and the San Diego Air Basin. The South Coast Air Basin both transports pollutants to and receives air pollutants from the coastal portions of Ventura and Santa Barbara counties in the South Central Coast Air Basin. The South Coast Air Basin also receives air pollutants from oil and gas development operations on the outer continental shelf. The 1991 AQMP does not specifically address the control requirements for adjacent areas. However, the control measures in this Plan do meet all CCAA transport requirements and will assist downwind areas in coming into compliance.

Areas upwind of the South Coast Air Basin (primarily Ventura County, but also including Santa Barbara County and the outer continental shelf) will need to reduce emissions to allow those areas to come into compliance with all air quality standards. If the South Coast Air Basin is to comply, sources in these upwind areas will need to reduce emissions further, i.e., reduce emissions beyond what may be required to achieve the standards in these areas. All analyses in this Plan assume that control measures apply equally to the South Coast Air Basin and upwind areas.

FORMAT OF THIS DOCUMENT

This document is organized into 10 chapters each addressing a specific topic. Each chapter is summarized below.

Chapter 2, "Current Air Quality," discusses the Basin's air quality in comparison with the federal and state air pollution standards.

Chapter 3, "Current and Future Emissions," summarizes recent updates to the emissions inventories, estimates current emissions by source and pollutant, and projects future emissions with and without controls.

Chapter 4, "AQMP Control Strategy," presents a detailed analysis of the attainment strategies for the AQMP.

Chapter 5, "Future Air Quality," describes the modeling approach used by the District and summarizes the Basin's future air quality projections with and without controls.

Chapter 6, "California Clean Air Act Requirements," discusses specific California Clean Air Act requirements as they pertain to the District's Plan.

Chapter 7, "Implementation," presents the implementation schedule of the various control measures and delineates each agency's area of responsibility.

Chapter 8, "Toxic Air Contaminants," addresses state requirements regarding toxic air contaminants, the District's regulatory program, and whether AQMP control measures will increase or decrease air toxics.

Chapter 9, "Global Warming and Ozone Depletion," describes the District's recently adopted policy on this issue, estimates the emissions of some ozone-depleting compounds in the Basin, and discusses how AQMP control measures will impact global warming and ozone depletion.

Chapter 10, "Energy," presents both energy conservation targets and the energy impacts that will result from the Plan's implementation.

Contingency measures are presented in the last part of this document.

II

CURRENT AIR QUALITY





Pliny "Mac" Barnes, Jr. and commuters in front of City Hall in Los Angeles

Driving Away Smog

Each morning before dawn, Mac Barnes, the prince of rideshare, boards his bus in Redlands, stopping to pick up commuters en route to downtown Los Angeles and his own job—he's a vice president at First Interstate Bank.

In the old days, back in the early 70's, Barnes used a standard van but when his ridership increased, he graduated first to a stretch van and then to a minibus. Finally, he purchased a fullsize bus with ample room for his 40 commuters.

CHAPTER 2

CURRENT AIR QUALITY

Ambient Air Quality Standards

Air Quality Trends

Current Air Quality

AMBIENT AIR QUALITY STANDARDS

Both California and the federal government have set air quality standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM₁₀, and lead (Table 2-1). The California standards are more stringent than the federal standards, and in the case of PM₁₀ and sulfur dioxide, far more stringent. California has also set standards for sulfate, visibility, hydrogen sulfide, and vinyl chloride.

AIR QUALITY TRENDS

Over the last decade and a half, there has been significant improvement in air quality in the South Coast Air Basin (Basin). Trends in the percent of days exceeding the federal standards over the fifteen-year period from 1975 to 1990 are shown in Figure 2-1. Between 1975-1977 and 1988-1990 exceedances of the standards for lead were completely eliminated. Other improvements include a 21 percent reduction in the number of days that ozone exceeded the standard, a 61 percent reduction for carbon monoxide, and an 89 percent reduction for nitrogen dioxide. The sulfur dioxide standard was met throughout the period. No significant trend can be seen over the relatively short period for which PM₁₀ has been monitored.

Ozone, the pollutant which exceeds the federal standard level most frequently, has been monitored continuously at a few Basin locations since the late 1950s. Azusa, in the most impacted area of the Basin, recorded 221 days exceeding the federal standard in 1960, 190 days in 1970, 129 days in 1980 and 84 days in 1990. Hourly ozone concentrations approaching 0.70 ppm were reported in the early 1950s, and Stage III Episodes (ozone exceeding 0.50 ppm) were frequent events in the 1960s. During the period 1986-1990, the highest hourly concentration recorded in the Basin was 0.35 ppm. Despite a population increase of 81 percent between 1960 and 1990, and associated increases in industrial activity and vehicle miles traveled, pollutant concentrations have been significantly reduced. Nonetheless, in 1990 measured concentrations of some pollutants were still well above standards set to protect public health.

TABLE 2-1
Ambient Air Quality Standards

	STATE STANDARD	FEDERAL PRIMARY STANDARD	MOST RELEVANT EFFECTS
AIR POLLUTANT	CONCENTRATION/AVERAGING TIME	CONCENTRATION/AVERAGING TIME	
Ozone	0.09 ppm, 1-hr. avg. >	0.12 ppm, 1-hr avg.	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals. (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. > 20 ppm, 1-hr avg. >	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	0.25 ppm, 1-hr avg. >	0.053 ppm,ann avg.	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.05 ppm, 24-hr avg. >= with ozone >= 0.10 ppm,1-hr avg or TSP >= 100 ug/m ³ , 24-hr avg. 0.25 ppm, 1-hr. avg. >	0.03 ppm,ann. avg. 0.14 ppm,24-hr avg.	(a) Bronchoconstriction accompanied by symptoms, which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM ₁₀)	30 ug/m ³ , ann. geometric mean > 50 ug/m ³ , 24-hr average >	50 ug/m ³ , annual arithmetic mean 150 ug/m ³ , 24-hr avg.	(a) Prevention of excess deaths from short-term exposures and of exacerbation of symptoms in sensitive patients with respiratory disease; (b) Prevention of excess seasonal declines in pulmonary function, especially in children
Sulfates	25 ug/m ³ , 24-hr avg. >=		(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	1.5 ug/m ³ , 30-day avg. >=	1.5 ug/m ³ ,calendar quarter	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction
Visibility Reducing Particles	In sufficient amount to reduce the visual range to less than 10 miles at relative humidity less than 70%, 8-hour average (9am - 5pm).		Visibility impairment on days when relative humidity is less than 70 percent

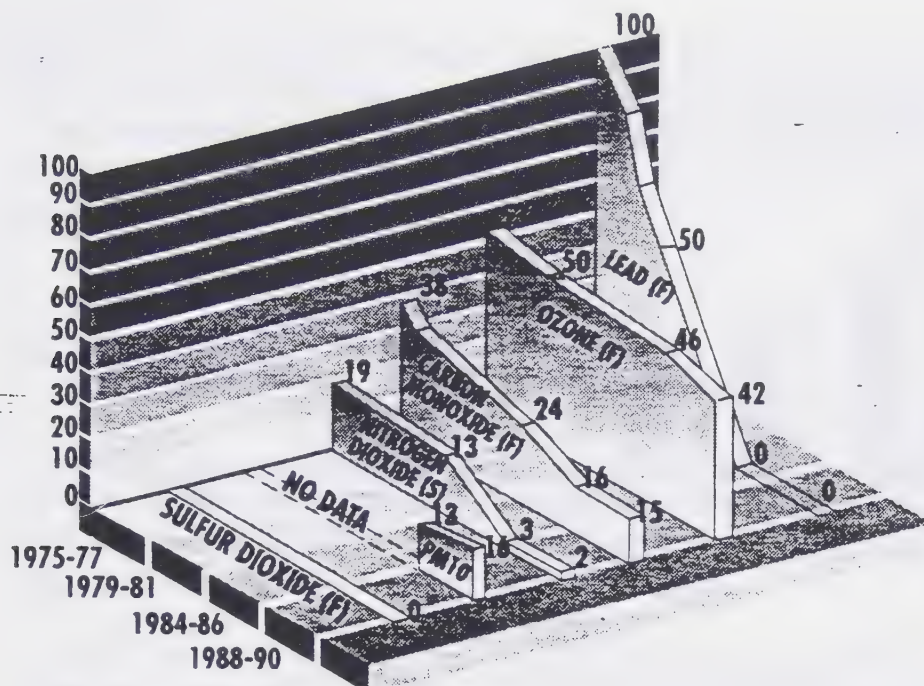


FIGURE 2-1

Percent of Days Exceeding Levels of Federal (F) or State (S) Standard, 1975-1990

CURRENT AIR QUALITY

In 1989, one or more of the federal standards were exceeded on 219 days in the Basin. The federal ozone standard was exceeded over three times as frequently in the Basin as in any other area of the United States. The Basin was the only area in the country to exceed the federal nitrogen dioxide standard. It exceeded the carbon monoxide standard most frequently as well, with two and one-half times as many exceedances as the next worst area of the nation. The highest annual average PM10 concentration was also recorded in the Basin, and was 1.2 times as high as the next highest in the United States.

Figure 2-2 shows the maximum pollutant concentrations in 1990 as a percent of the state and federal standards. Figure 2-3 shows the percent of days, months, or quarters in which each pollutant exceeded the standards at the most affected location.

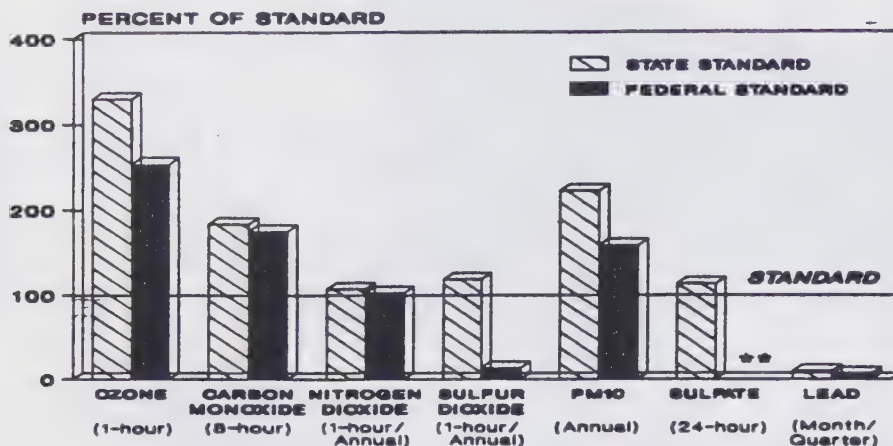
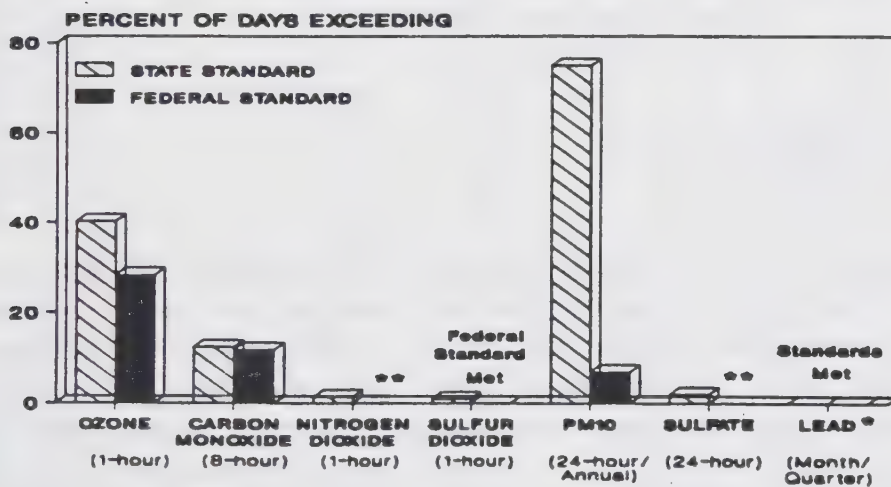


FIGURE 2-2
1990 Maximum Pollutant Concentrations
as Percent of State and Federal Standards



*Percent of months for state standard and percent of quarters for federal standards.
 **There is no federal standard for sulfate and no short-term federal standard for nitrogen dioxide.

FIGURE 2-3
1990 Percent of Days/Months/Quarters Exceeding
State and Federal Standards at Most Affected Locations

Appendix II-A contains a detailed analysis of 1990 air quality and statistics for all monitoring locations for the years 1987-1990. Appendix II-B contains detailed information on air quality trends over the past decade. The following section discusses which areas in the Basin exceeded state and federal standards in 1990.

Ozone

Significant progress has been made in reducing ozone concentrations over the past decade in the Basin and the Southeast Desert Air Basin (SEDAB). However the Basin still exceeds the federal ozone standard far more frequently than any other area of the United States.

In 1990 the South Coast Air Quality Management District (District) monitored ozone at 33 sites. The state standard was exceeded at all locations. The federal standard was exceeded at all but two locations. The Stage I Episode level (1-hour average ozone equal to or greater than 0.20 ppm) was exceeded at 16 of the 33 locations.

In 1989, Crestline, in the Basin's mountain area, had the greatest number of exceedances of the federal ozone standard in the entire United States (127 days). Except for nearby locations in the Basin and the SEDAB, no other area of California or the United States exceeded the standard nearly as frequently. The next highest area outside of the Basin, (Simi Valley, California) recorded only 40 exceedances of the federal standard, and the next highest area of the United States outside California, (Houston, Texas) recorded only 14 exceedances.

Figure 2-4 shows that, during 1990, the state ozone standard was exceeded least frequently in the coastal areas and most frequently in the area extending from the eastern San Fernando Valley through the San Gabriel Valley into the Riverside-San Bernardino area and the adjacent mountains. The number of exceedances decreased further inland, in the desert areas.

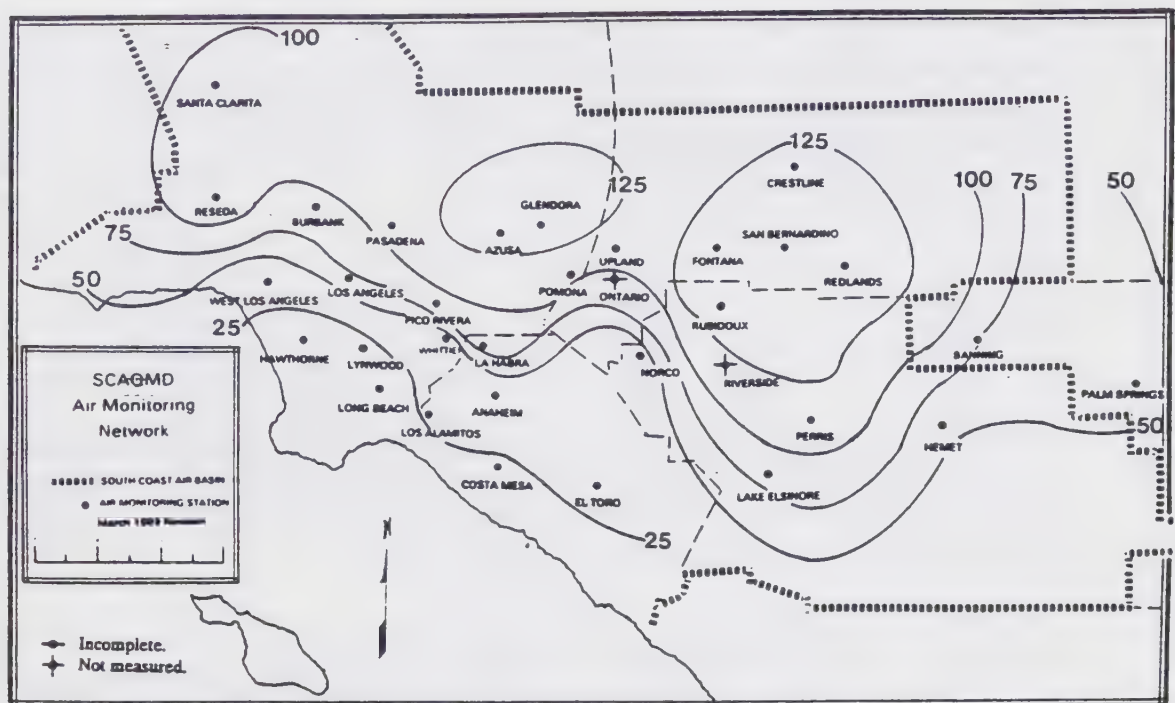


FIGURE 2-4
OZONE

Number of Days Exceeding State Standard in 1990
(1-hour average concentration greater than 0.09 ppm)

In 1990, the state standard was exceeded most frequently at Glendora (147 days). The federal standard was exceeded most frequently at Glendora and Crestline (103 days). The greatest number of Stage I Episodes (29 days) was recorded at Glendora. The highest 1-hour average ozone concentration (0.33 ppm) was recorded at Crestline. No Stage II Episodes (1-hour average 0.35 ppm or greater) occurred in 1990.

Carbon Monoxide

The number of days exceeding the carbon monoxide standards decreased substantially between the mid-70s and the mid-80s. After the mid-80s, however, there was an increase in the number of exceedances, followed by a decrease in 1990. The observed increase was probably due to increased vehicle miles traveled. In 1989, Los Angeles County recorded more exceedances of the federal carbon monoxide standard than any other area of

the United States.

In 1990, exceedances of the standard were limited to Los Angeles and Orange counties (Figure 2-5). The areas with the highest carbon monoxide concentrations were located in coastal and central Los Angeles County.

In 1990 carbon monoxide was monitored at 24 locations. The state standard was exceeded at 11 locations, and the federal standard was exceeded at 10 locations. The state 8-hour standard was exceeded most frequently at Lynwood (44 days). Lynwood also reported the greatest number of exceedances of the federal 8-hour standard (42 days). The highest 8-hour average concentration, also at Lynwood, was 16.8 ppm. In 1989, Lynwood recorded the greatest number of federal standard exceedances (55 days), and the second highest 8-hour average concentration (21.8 ppm) in the United States.

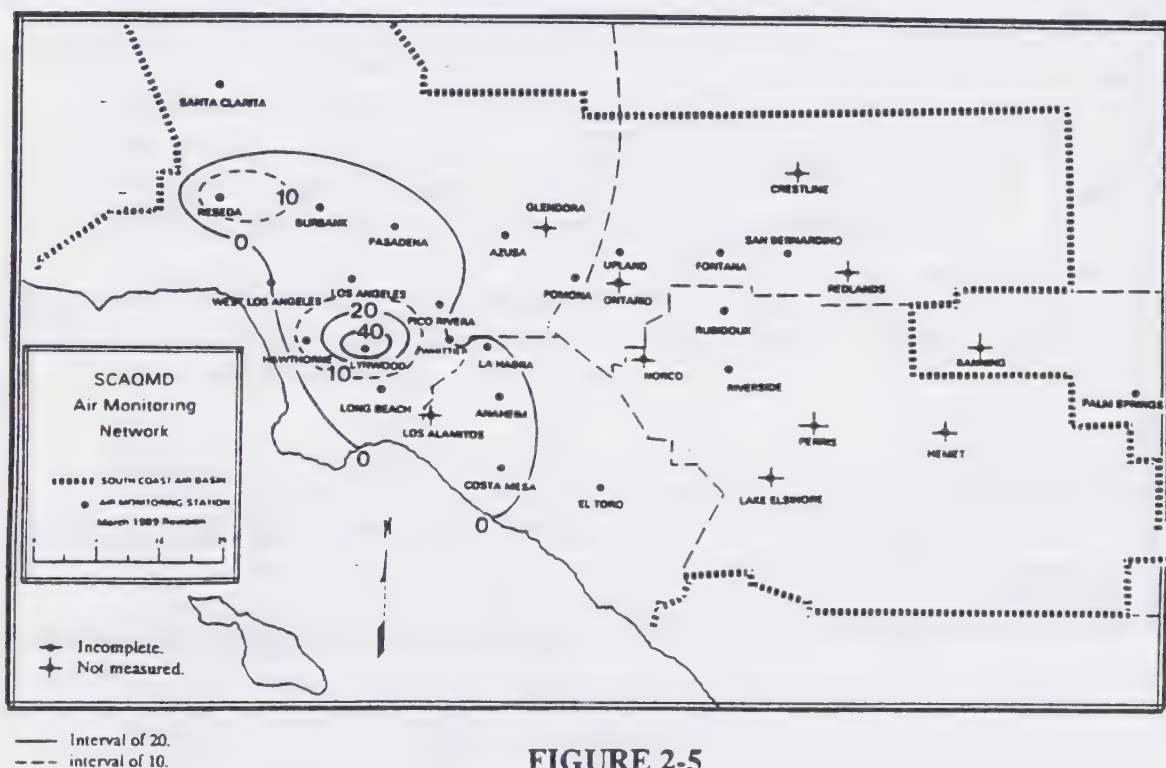


FIGURE 2-5
CARBON MONOXIDE

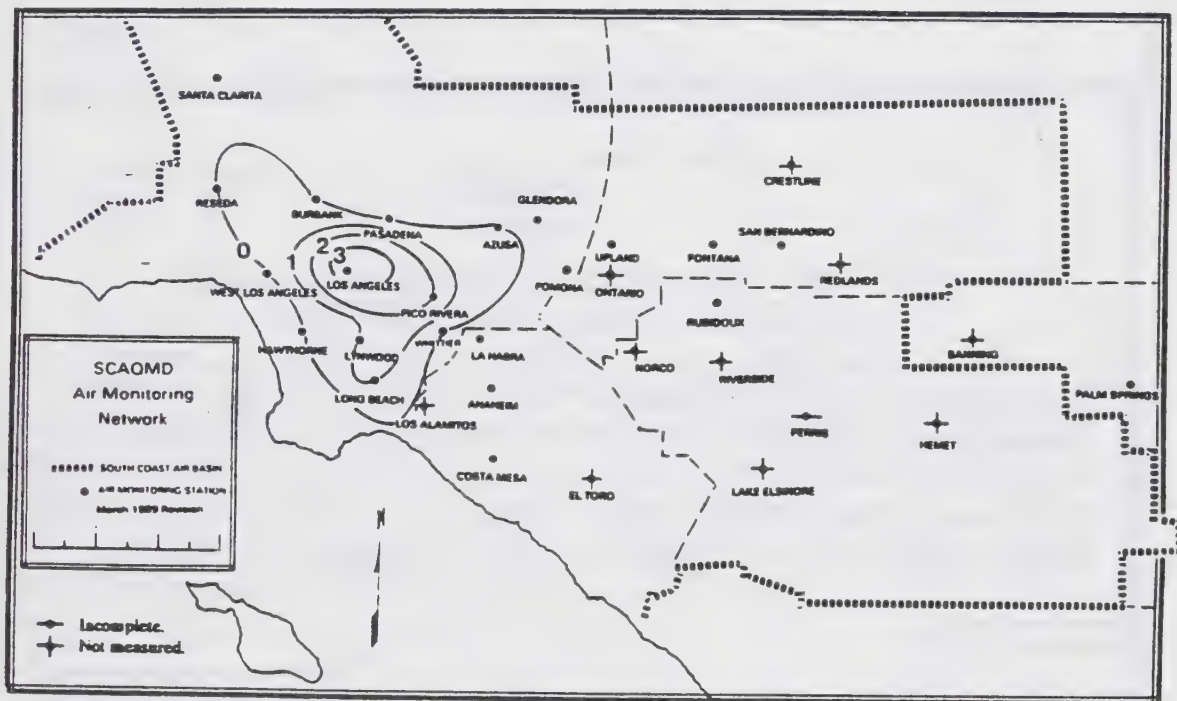
Number of Days Exceeding State Standard in 1990
(8-hour average concentration greater than 9.0 ppm)

Nitrogen Dioxide

Concentrations of nitrogen dioxide decreased over the period 1976-1989. By 1990, exceedances of the federal standard were limited to one location in Los Angeles County, with the highest concentration four percent greater than the federal standard. Los Angeles County is the only county in the United States that does not meet the federal nitrogen dioxide standard.

In 1990, nitrogen dioxide was monitored at 24 locations. Of these, four locations exceeded the state standard and one exceeded the federal standard.

Figure 2-6 shows the number of days on which the state nitrogen dioxide standard was exceeded in 1990. Exceedances were limited to coastal and central Los Angeles County.



**FIGURE 2-6
NITROGEN DIOXIDE**

Number of Days Exceeding State Standard in 1990
(1-hour average concentration greater than 0.25 ppm)

In 1990, the federal standard was exceeded by four percent at Pomona. Los Angeles exceeded the state standard most frequently in 1990 (three days). The highest 1-hour average nitrogen dioxide concentration, recorded at Los Angeles, was 8 percent above the state standard (0.28 ppm). This Basin was the only area in the entire United States which exceeded the federal standard in 1989.

PM10

In 1990, state PM10 standards were exceeded in all areas, frequently by a wide margin. The less stringent federal PM10 standards were also exceeded in many areas.

In 1990 PM10 was monitored at 18 sites. The state standards (annual geometric mean PM10 greater than 30 micrograms per cubic meter, or 24-hour average PM10 greater than 50 micrograms per cubic meter) were exceeded at all but one location. One location did not exceed the annual standard. The federal annual standard (annual arithmetic mean PM10 greater than 50 micrograms per cubic meter) was exceeded at 10 locations and the federal 24-hour standard (24-hour average greater than 150 micrograms per cubic meter) was also exceeded at 10 locations.

Figure 2-7 shows the 1990 annual average (geometric mean) PM10 concentrations in different areas. Concentrations averaged lowest near the coast and highest in the inland valleys.

Rubidoux, in the Riverside County portion of the Basin, reported the highest annual average PM10 concentration (annual geometric mean $67 \mu\text{g}/\text{m}^3$). The highest 24-hour average PM10 ($520 \mu\text{g}/\text{m}^3$) was reported at Indio, in the neighboring SEDAB. This unusually high 24-hour PM10 concentration was associated with high winds which resulted in windblown soil and dust. In the Basin the highest 24-hour concentration recorded in 1990 was $475 \mu\text{g}/\text{m}^3$ at Fontana. This high concentration was also associated with high winds. In 1989, Rubidoux recorded the highest annual average PM10 concentration in the entire United States (annual arithmetic mean, $94 \mu\text{g}/\text{m}^3$).

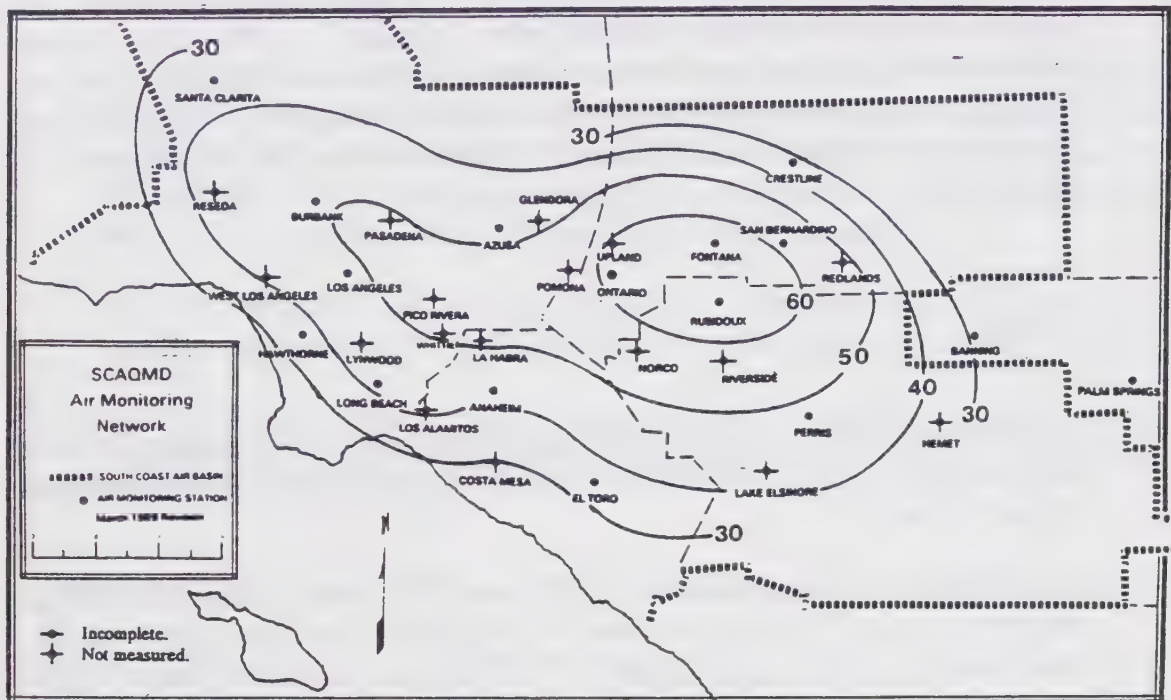


FIGURE 2-7
PM10

1990 Annual Average Concentration Compared to State Standard
(Annual geometric mean concentration greater than $30 \mu\text{g}/\text{m}^3$)

Sulfur Dioxide

Though sulfur dioxide concentrations have been reduced to levels well below state and federal standards, further reductions in emissions of sulfur oxides are needed to attain compliance with standards for other pollutants (sulfate and PM10).

Sulfur dioxide concentrations exceeded the state 1-hour standard in 1990 at one location on one day. Federal standards were not exceeded. The highest 1-hour average concentration (0.31 ppm) was recorded at Hawthorne and was 19% higher than the standard. This was the first exceedance of the standard since 1984, caused by an equipment breakdown at a local refinery.

Sulfates

In 1990, four locations exceeded the sulfate standard. Sulfate concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of sulfur dioxide and limits on the sulfur content of fuels.

In 1990, Pasadena exceeded the standard most frequently (1.8% of days). The maximum 24-hour average ($28.4 \mu\text{g}/\text{m}^3$ at Pasadena), was 13 percent above the standard.

Lead

Lead concentrations once exceeded the state and federal standards by a wide margin, but have not exceeded any standard since 1982. In 1990, the highest concentrations recorded were only a small fraction of the standards.

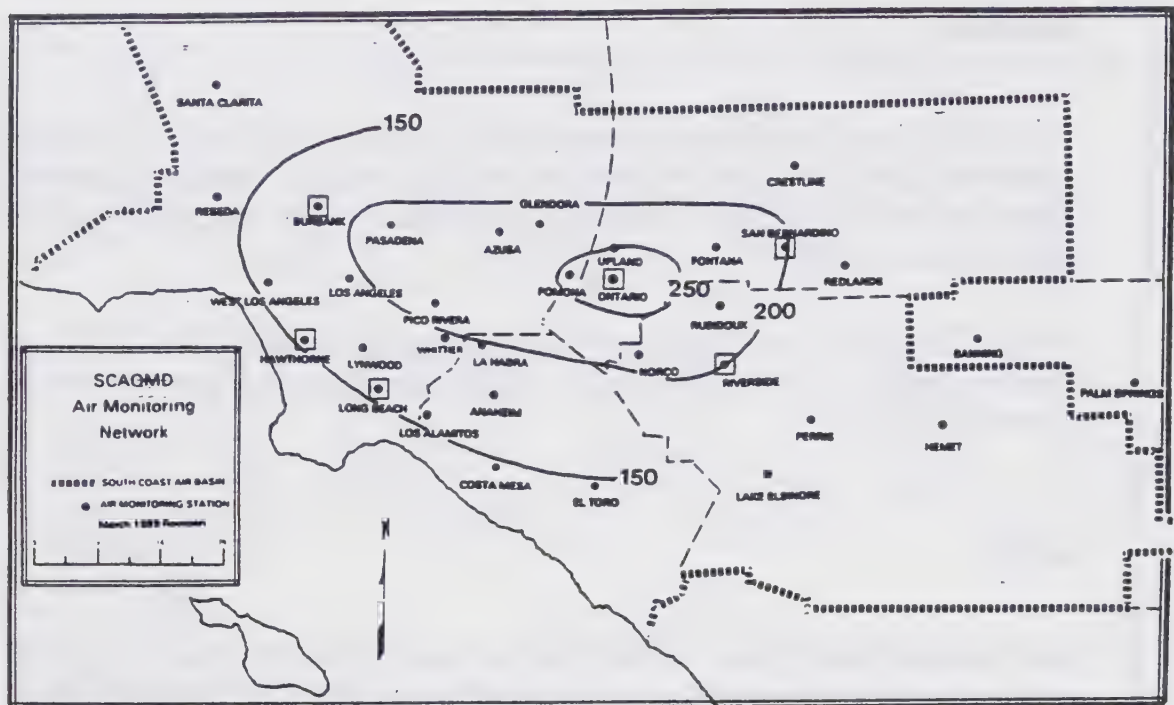
The 1990 maximum monthly average lead concentration, recorded at Lynwood ($0.14 \mu\text{g}/\text{m}^3$), was slightly less than a tenth of the state standard. Lynwood and Pico Rivera recorded the highest quarterly average lead concentration ($0.11 \mu\text{g}/\text{m}^3$), less than a tenth of the federal standard.

Visibility

The effect of air pollution on visibility is not limited to simply reducing the distance a person can see, but also includes negative aesthetic impacts on the color, form, and contrast of the scene being viewed. In 1990, the state visibility standard was violated in a wide area of the Basin and by a significant margin.

Visibility data were obtained for six locations in 1990, all of which violated the standard. The standard was violated most frequently at Ontario (250 days).

Figure 2-8 shows the number of days in 1990 that the visibility standard was violated. The standard was violated least frequently in the coastal areas and most frequently in the inland valleys of the Basin.



- * Visibility less than 10 miles at relative humidity less than 70%.
- ◻ Measured closest to this location, but not at the air monitoring stations.

FIGURE 2-8 VISIBILITY

Number of Days Not Meeting State Standard in 1990
(Minimum Hourly Visibility less than 10 miles with
Relative Humidity less than 70 percent)

Summary

Though pollutant concentrations in the Basin have been reduced significantly over the past decade, some standards are still exceeded frequently and by a wide margin.

A detailed summary of the 1990 maximum concentrations and the frequencies of exceedances for each of the monitoring stations in the Basin and SEDAB is presented in Table 2-2.

TABLE 2-2
1990 Air Quality

Source/ Receptor Area No.	Location of Air Monitoring Station	Carbon Monoxide						Ozone			Nitrogen Dioxide				Sulfur Dioxide					Visibility			
		Max. Conc. in PPM 1-Hour	Max. Conc. in PPM 8-Hour	No. Days Standard Exceeded				Max. Conc. in PPM 1-Hour	No. Days Standard Exceeded		Max. Conc. in PPM 1-Hour	Average Compared to Federal Standard ^{a)}		No. Days Std. Exc'd. Above Std. 1-Hour	Max. Conc. in PPM 1-Hour	Max. Conc. in PPM 24-hour	Average Compared to Federal Standard ^{b)}		No. Days Std. Exc'd. ^{c)} Above Std. 24-Hr. ^{d)}	Location	Days not Meeting State Std. ^{e)}		
				Federal					State			Federal					State						
				≥ 9.5	> 35	≥ 9.1	> 20		> .12	> .09		in AAM	%				> .25	> .25/				> .14	≥ .05
				PPM	PPM	PPM	PPM		PPM	PPM		PPM	PPM				PPM	PPM				PPM	PPM
1	Los Angeles	13	9.9	1	0	1	0	.20	32	70	.28	.0467	0	3	.02	.013	.0017	0	0/0	Los Angeles	156		
2	W. Los Angeles	15	8.0	0	0	0	0	.16	8	30	.20	.0324	0	0	.02*	.009*	.0021*	0*	0/0*	International			
3	Hawthorne	19	12.7	10	0	11	0	.10	0	3	.23	.0339	0	0	.31	.035	.0035	0	1/0				
4	Long Beach	11	9.1	0	0	1	0	.12	0	5	.27	.0393	0	1	.05	.013	.0031	0	0/0	Long Beach	155		
5	Whittier	12	9.0	0	0	0	0	.19	21	47	.23	.0428	0	0	.04	.009	.0016	0	0/0	Airport			
6	Reseda	19	14.9	10	0	11	0	.19	41	108	.19	.0340	0	0	.02*	.010*	.0015*	0*	0/0*				
7	Burbank	16	13.0	8	0	8	0	.20	40	95	.23	.0479	0	0	.02	.011	.0018	0	0/0	Burbank	180		
8	Pasadena	16	10.0	1	0	1	0	.26	69	118	.23	.0474	0	0	.02*	.008*	.0015*	0*	0/0*	Airport			
9	Azusa	7	5.1	0	0	0	0	.23	84	133	.21	.0410	0	0	.03*	.008*	.0011*	0*	0/0*				
9	Glendora	NM	NM	NM	NM	NM	NM	.29	103	147	.19	.0377	0	0	NM	NM	NM	NM	NM				
10	Pomona	13	7.5	0	0	0	0	.24	60	104	.21	.0555	3.7	0	NM	NM	NM	NM	NM				
11	Pico Rivera	13	9.4	1	0	1	0	.19	43	85	.27	.0499	0	2	.04*	.014*	.0043*	0*	0/0*				
12	Lynwood	24	16.8	42	0	44	7	.15	3	11	.26	.0408	0	1	.04	.012	.0033	0	0/0	William J. Fox	14		
13	Santa Clarita	11	4.6	0	0	0	0	.23	62	115	.15	.0316	0	0	.01*	.004*	.0009*	0*	0/0*	Airport			
14	Lancaster f)	11	8.3	0	0	0	0	.15	7	32	.09	.0200	0	0	NM	NM	NM	NM	NM	(Lancaster)			
16	La Habra	19	9.6	2	0	2	0	.21	35	76	.22	.0447	0	0	.03	.007	.0011	0	0/0				
17	Anaheim	17	11.7	1	0	1	0	.18	11	34	.21	.0469	0	0	.02*	.009*	.0018*	0*	0/0*				
17	Los Alamitos	NM	NM	NM	NM	NM	NM	.17	7	29	NM	NM	NM	NM	.03	.009	.0019	0	0/0				
18	Costa Mesa	13	10.7	4	0	5	0	.15	3	12	.22	.0272	0	0	.02	.008	.0007	0	0/0				
19	El Toro	9	5.6	0	0	0	0	.19	11	32	NM	NM	NM	NM	NM	NM	NM	NM	NM				
22	Norco	NM	NM	NM	NM	NM	NM	.17	13	41	NM	NM	NM	NM	NM	NM	NM	NM	NM				
23	Rubidoux	10	6.3	0	0	0	0	.29	90	142	.16	.0336	0	0	.03	.005	.0003	0	0/0				
23	Riverside	15	7.3	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	March Field	200		
24	Perris	NM	NM	NM	NM	NM	NM	.19	62	116	.11*	.0282*	0*	0*	NM	NM	NM	NM	NM	(Riverside)			
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	.19	36	80	NM	NM	NM	NM	NM	NM	NM	NM	NM				
28	Hemet	NM	NM	NM	NM	NM	NM	.22	20	60	NM	NM	NM	NM	NM	NM	NM	NM	NM				
29	Banning	NM	NM	NM	NM	NM	NM	.22	43	75	NM	NM	NM	NM	NM	NM	NM	NM	NM				
30	Palm Springs	5	2.3	0	0	0	0	.17	27	73	.09	.0206	0	0	NM	NM	NM	NM	NM				
30	Indio	NM	NM	NM	NM	NM	NM	.16	10	47	NM	NM	NM	NM	NM	NM	NM	NM	NM				
32	Upland	9	6.6	0	0	0	0	.29	64	113	.19	.0411	0	0	.01*	.006*	.0012*	0*	0/0*				
33	Ontario	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Ontario	250		
34	Fontana	6	4.9	0	0	0	0	.27	92	132	.20	.0393	0	0	.01	.003	.0001	0	0/0	Airport			
34	San Bernardino	9	6.0	0	0	0	0	.29	78	129	.20	.0343	0	0	.01*	.001*	.0001*	0*	0/0*	Norton AFB	200		
35	Redlands	NM	NM	NM	NM	NM	NM	.30	81	131	NM	NM	NM	NM	NM	NM	NM	NM	NM	(San Bernardino)			
37	Crestline	NM	NM	NM	NM	NM	NM	.33	103	144	NM	NM	NM	NM	NM	NM	NM	NM	NM				

* - Less than 12 full months of data. Monitoring discontinued.

PPM - Parts by volume per million parts of air.

AAM - Annual Arithmetic Mean.

NM - Pollutant not monitored.

a) - The federal standard is annual arithmetic mean NO₂ greater than 0.0534 PPM.

b) - The federal standard is annual arithmetic mean SO₂ greater than 80 ug/m³ (0.03 PPM). No location exceeded the standard in 1990.

c) - The other federal standards (3-hour average > 0.50 PPM; AAM > 0.03 PPM) were not exceeded.

d) - Twenty-four hour average SO₂ ≥ 0.05 PPM with 1-hour Ozone ≥ 0.10 PPM, or with 24-hour TSP ≥ 100 ug/m³.

e) - Visibility data are comparable to previous state standard. Visibility standard is less than 10 miles for hours with relative humidity less than 70%. Monitoring using equipment required by current standard is expected to begin in 1991.

f) - Station relocated in February 1990.

TABLE 2-2 (Continued)

1990 Air Quality

Source/ Receptor Area No.	Location of Air Monitoring Station	Suspended Particulates PM10 ^{g)}						Particulates TSP ^{h)}			Lead ^{h)}				Sulfate ^{h)}	
		Number of Samples	Max. Conc. In ug/m ³ 24-hour	No. (%) Samples Exceeding Standard		Annual Averages ⁱ⁾		Number of Samples	Max. Conc. In ug/m ³ 24-Hr.	AGM Conc. ug/m ³	Quarters/Months Exceeding Standard				Max. Conc. In ug/m ³ 24-Hr.	State ≥25 ug/m ³ 24-Hr.
				Federal >150 ug/m ³ 24-Hour	State >50 ug/m ³ 24-Hour	AAM Conc. ug/m ³	AGM Conc. ug/m ³				Max. Conc. ug/m ³	Max. Qtrly. Conc. ug/m ³	Federal >1.5 ug/m ³ Qtrly Avg.	State ≥1.5 ug/m ³ Mo. Avg.		
1	Los Angeles	60	152	1(1.7)	31(51.7)	53.2	48.3	60	211	98.7	0.09	0.09	0	0	25.3	1(1.7)
2	W. Los Angeles	NM	NM	NM	NM	NM	NM	54	163	62.1	NM	NM	NM	NM	24.8	0
3	Hawthorne	60	127	0	17(28.3)	41.2	37.6	61	186	73.8	0.08	0.06	0	0	24.8	0
4	Long Beach	58	119	0	14(24.1)	44.3	40.6	61	188	81.9	0.09	0.07	0	0	22.6	0
5	Whittier	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6	Reseda	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7	Burbank	60	161	1(1.7)	28(46.7)	52.3	47.6	60	191	89.2	0.08	0.07	0	0	25.9	1(1.7)
8	Pasadena	NM	NM	NM	NM	NM	NM	57	142	69.5	NM	NM	NM	NM	28.4	1(1.8)
9	Azusa	60	127	0	30(50.0)	54.9	47.9	61	228	104.4	NM	NM	NM	NM	16.0	0
9	Glendora	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10	Pomona	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11	Pico Rivera	NM	NM	NM	NM	NM	NM	60	195	92.9	0.13	0.11	0	0	21.1	0
12	Lynwood	NM	NM	NM	NM	NM	NM	59	233	102.2	0.14	0.11	0	0	28.1	1(1.7)
13	Santa Clarita	57	93	0	15(26.3)	43.3	38.6	NM	NM	NM	NM	NM	NM	NM	NM	NM
14	Lancaster ^{j)}	58	342	2(3.4)	22(37.9)	52.9	43.8	28*	217*	78.9*	NM	NM	NM	NM	6.0*	0*
16	La Habra	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
17	Anaheim	59	158	1(1.7)	20(33.9)	49.1	43.1	58	422	91.3	0.10	0.06	0	0	18.3	0
17	Los Alamitos	NM	NM	NM	NM	NM	NM	60	834	103.4	NM	NM	NM	NM	16.8	0
18	Costa Mesa	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
19	El Toro	55	88	0	16(29.1)	43.1	39.7	30*	132*	78.2*	NM	NM	NM	NM	13.4*	0*
22	Morco	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
23	Rubidoux	61	207	3(4.9)	46(75.4)	78.4	66.9	61	274	110.1	0.08	0.05	0	0	19.9	0
23	Riverside	NM	NM	NM	NM	NM	NM	59	223	96.0	0.08	0.05	0	0	19.3	0
24	Perris	61	250	3(4.9)	32(52.5)	58.9	49.6	30*	232*	71.6*	NM	NM	NM	NM	12.9*	0*
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
28	Nemet	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
29	Banning	54	89	0	11(20.4)	35.4	29.4	30*	167*	60.4*	NM	NM	NM	NM	8.6*	0*
30	Palm Springs	59	83	0	9(15.3)	34.5	30.5	30	170*	57.4*	NM	NM	NM	NM	5.6*	0*
30	Indio	59	520	4(6.8)	41(69.5)	79.3	64.9	29*	1485*	130.5*	NM	NM	NM	NM	7.0*	0*
32	Upland	NM	NM	NM	NM	NM	NM	60	289	93.0	0.07	0.05	0	0	18.7	0
33	Ontario	59	185	4(6.8)	37(62.7)	71.7	61.0	29*	243*	90.6*	NM	NM	NM	NM	19.9*	0*
34	Fontana	59	475	3(5.1)	43(72.9)	77.6	62.7	59	1770	115.6	NM	NM	NM	NM	18.3	0
34	San Bernardino	60	235	2(3.3)	35(58.3)	65.0	54.8	60	289	100.9	0.07	0.05	0	0	17.3	0
35	Redlands	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
37	Crestline	59	88	0	11(18.6)	36.6	31.1	30*	124*	46.7*	NM	NM	NM	NM	6.6*	0*

* - Less than 12 full months of data. Monitoring discontinued.

ug/m³ - Micrograms per cubic meter of air.

AGM - Annual Geometric Mean.

g) - PM10 suspended particulates samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media (PM10 refers to fine particles with aerodynamic diameter of 10 micrometers or less).

h) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superseded by PM10 standard, July 1, 1987.

i) - Federal PM10 standard is AAM > 50 ug/m³; state standard is AGM > 30 ug/m³.

j) - Station relocated in February 1990.

III CURRENT AND FUTURE EMISSIONS





Clockwise from upper left: Manager Ruby M. Irigoyen and supervisor Fred M. Bogdanov of CTAC; Richard J. Stegemeier, Chairman, President, and CEO, UNOCAL; ARCO introduced EC-1 in 1989

Energy Companies Pitch In

- Southern California Edison's Customer Technology Application Center (CTAC) in Irwindale provides a hands-on test site and demonstration facility to business and industry. The multi-purpose center is equipped with the latest environmentally-friendly technologies including low emission coatings systems and energy-saving lighting and appliances.
- In Summer 1990 UNOCAL introduced SCRAP, a program to buy back pre-'71 cars and junk them. Owners of these highly polluting cars, 8,376 in all, were paid \$700 each and as a result, all of the Southland can breathe a little easier.
- ARCO's reformulated gasoline, EC-1 Regular, helped get the lead out of the air over the Los Angeles Basin. Developed for vehicles built before introduction of the catalytic converter, it was soon followed with the introduction of EC-Premium.

CHAPTER 3

CURRENT AND FUTURE EMISSIONS

Introduction

Emissions Inventories

Current Emissions

Future Emissions

INTRODUCTION

In order to propose effective control measures, it is first necessary to identify the sources of pollution and to quantify the type and amount of emissions they contribute. This chapter summarizes emissions occurring in the Basin during the base year, 1987, and emissions predicted to occur in the years 1994, 1997, 2000, and 2010.

The base year 1987 emissions are based principally on the reported data. The emission forecasts for future years reflect demographic and economic growth forecasts by SCAG. The estimates include emission reductions from the rules and regulations adopted by the District and the ARB by June 30, 1990. The rules and regulations adopted since July 1, 1990, are treated as control measures in Chapter 4 to account for emission reductions.

EMISSIONS INVENTORIES

Baseline emission data presented in this chapter are based on average annual day emissions (i.e., total annual emissions divided by 365 days). The 1991 AQMP uses average annual day emissions to estimate the cost-effectiveness of a control measure and to rank control measure implementation.

Detailed descriptions of the baseline emissions inventory are presented in Appendices III-A (1987 Emissions Inventory for the South Coast Air Basin: Average Annual Day) and III-B (Future Baseline Emissions for the South Coast Air Basin: Average Annual Day).

CURRENT EMISSIONS

Emissions Inventory Development

The District has contracted several special studies to develop and improve the 1987 emissions inventory including:

- o PM10 emissions from open fugitive dust sources,
- o Emissions from locomotives,
- o Emissions of aircraft, and an
- o Emissions inventory for the Coachella Valley.

Several other studies were also undertaken to develop emission data, which, although not required by the CCAA, would facilitate better evaluation of air quality issues. These studies include:

- o Hydrocarbon emissions from vegetation,
- o Ammonia emissions, and
- o Emissions of greenhouse gases.

Results of these special studies are documented in various District technical working papers to the 1991 AQMP.

Stationary Sources

Stationary sources can be divided into two major subcategories: point and area sources. Point sources have one or more emission sources at a facility with an identified location (e.g., power plants, refinery boilers). Area sources, which do not have specifically identified locations, consist of many small emission sources (e.g., residential water heaters, architectural coatings). Their emissions over a given area may be calculated using socio-

economic data. For major point sources (i.e., those emitting more than 18 tons/year of any one of the criteria air contaminants), reported data for the year 1987 were used. Data for point sources emitting less than 18 tons/year were taken from the District's Automated Equipment Information System (AEIS) data base. For area sources, emissions were jointly developed by the ARB and the District for a total of more than 200 categories.

Mobile Sources

Mobile sources consist of two subcategories: on-road and off-road sources. On-road vehicle emissions are calculated using socio-economic data provided by SCAG, spatial distribution data from Caltrans' Direct Travel Impact Model (DTIM), and emission factors (EMFAC7E) obtained from the ARB. Major improvements have been made in EMFAC7E to account for vehicle evaporative emissions, ambient temperature, travel speed, and the effect of the state's Inspection/Maintenance Program. Emissions from off-road vehicle categories (e.g., trains, ships, utility engines) were calculated as area sources.

Gridded Emissions

For air quality modeling purposes, the region composed of the Basin, the Coachella Valley (which is within the District's jurisdiction), and Ventura County (upwind area) is divided into a grid system composed of 5 km by 5 km grid cells defined by Universal Transverse Mercator (UTM) coordinates. Both point and area source emissions are allocated to individual grid cells within this system. In general, the modeling emission data features episodic-day emissions. Seasonal variations in activity levels are taken into account in developing gridded stationary point and area sources emissions. Variations in temperature, hours of operation, speed of motor vehicles, or other factors are considered in developing gridded motor vehicle emissions. Hence, "gridded" emissions data used for ozone modeling applications (Chapter 5) would differ from the average annual day emission data for two reasons: (1) the modeling region covers larger geographic areas than the Basin, (2) emissions represent day-specific instead of average conditions.

Southern California Air Quality Study

The Southern California Air Quality Study (SCAQS) was a multiyear, multi-million dollar study involving several public agencies and private organizations to develop a comprehensive archived air quality and meteorological data base for the Basin. This data base is intended to be used to improve the technical capability of air quality planning. Emission data obtained from SCAQS for certain source categories (e.g., power plants, refineries, airports) were used to enhance the seasonal gridded stationary source emissions.

Emissions Summaries by Pollutant

Summaries of 1987 average annual day emissions data are presented in Table 3-1. Emissions of the criteria pollutants, ROG, NO_x, SO_x, CO, and PM₁₀, are listed by major source category. Figure 3-1 compares emission levels between 1985 and 1987. There is an increase in ROG emissions of approximately 130 tons/day. This is largely due to higher estimates of emission factors for floating roof tanks, refinery fugitive emissions, and motor vehicles, which contribute to an overall increase of about 70 tons per day. Additional ROG emission sources identified in the source categories of automobile refinishing and adhesive applications also contribute to the increase by about another 50 tons per day which were not previously accounted for. The increase of approximately 170 tons/day of NO_x emissions between 1985 and 1987 is primarily attributed to (1) a revised ARB methodology for estimating off-road vehicle emissions (100 tons/day) and (2) higher emission factors used in motor vehicle emission data development (60 tons/day). There is also a substantial increase in fugitive PM₁₀ emissions (about 330 tons/day) between 1985 and 1987 due to improvement in inventory methodology. CO emissions decrease by about 460 tons/day resulting mainly from older (higher-polluting) vehicles being replaced by newer (less-polluting) vehicles.

TABLE 3-1

Summary of Emissions
By Major Source Category: 1987 Base Year*
Average Annual Day (tons/day)

<u>Source Category</u>	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SOx</u>	<u>PM10</u>
Stationary Sources					
Fuel Combustion	17	267	78	23	14
Waste Burning	1	2	3	0	1
Solvent Use	464	0	0	0	1
Petroleum Process, Storage & Transfer	107	9	6	19	3
Industrial Processes	41	12	7	8	45
Misc Processes**	57	1	5	0	942
Total Stationary Sources	687	291	99	50	1,006
Mobile Sources					
On-Road Vehicles	605	664	4,363	32	53
Off-Road Mobile	83	253	525	52	16
Total Mobile Sources	688	917	4,888	84	69
Total	1,375	1,208	4,987	134	1,075

* The emissions used to track the 5 percent requirements
will be based on planning inventories, per ARB requirements.

** Travel-related road dust included

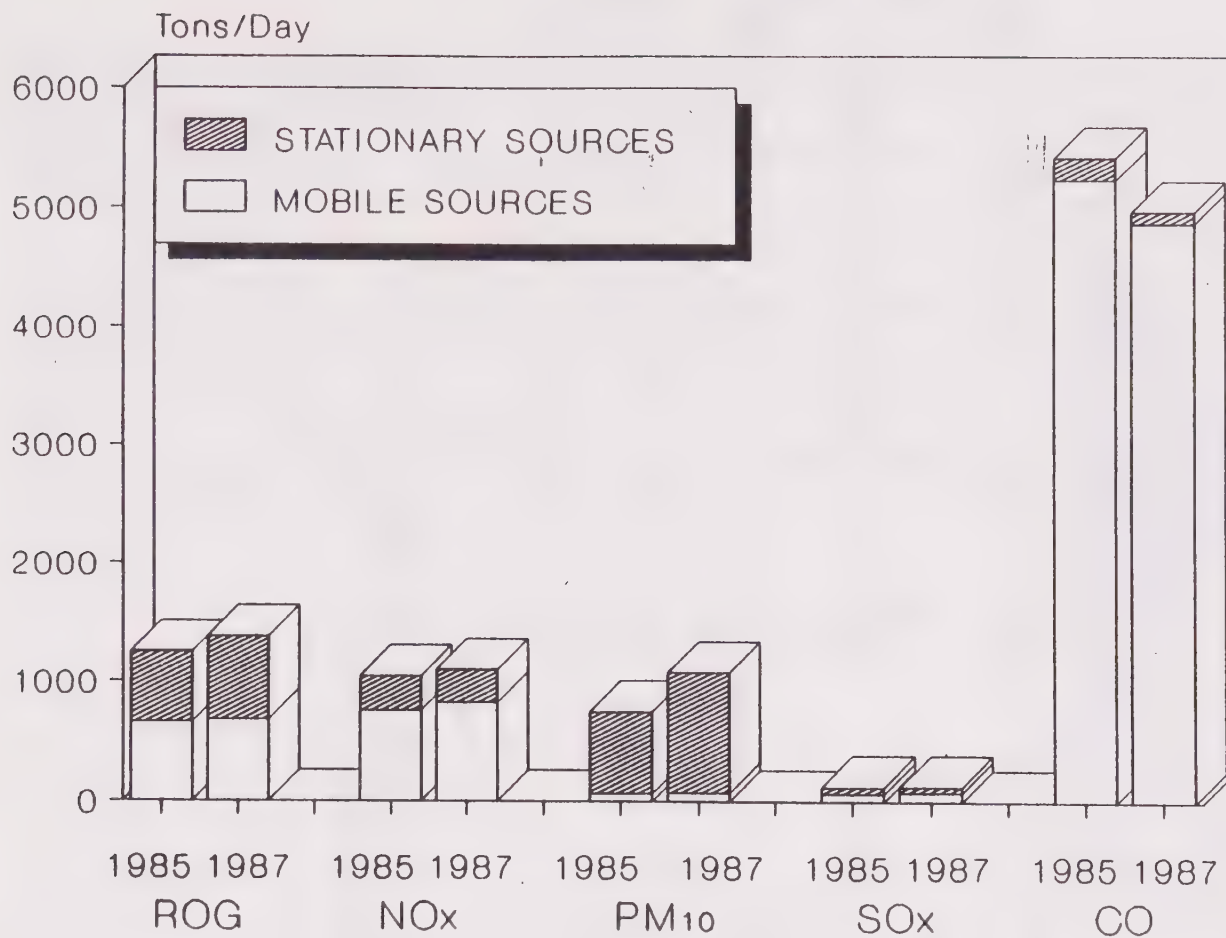


FIGURE 3-1

Comparison Between 1985 and 1987 Emission Levels Due to Improved Estimates of Emissions

Emissions Summaries by Category

The relative contributions by consumer sectors (i.e., residential, commercial, industrial, and transportation) to average annual day emissions are shown in Figure 3-2. The transportation sector is directly responsible for about half to 90 percent of the total emissions for all criteria pollutants, except for PM₁₀. It appears that area sources account for nearly all emissions (91%) of PM₁₀. However, this is because paved road dust caused by vehicle travel is considered as an area source emission instead of a mobile source emission. Thus, in reality, mobile sources were either directly or indirectly responsible for a major share of emissions of all criteria pollutants.

Figures 3-3 characterizes relative contributions by source categories: stationary and mobile sources. Stationary sources are subdivided into point (e.g., chemical manufacturing, petroleum production, and electric utilities) and area sources (e.g., architectural coatings, dry cleaners, and consumer products). Mobile sources consist of on-road (e.g., light-duty passenger car) and off-road sources (e.g., trains and ships).

Regarding stationary sources, point sources contribute two to three times more NO_x and SO_x emissions than area sources. However, area sources play a major role in ROG emissions. They contribute nearly twice as much ROG as point sources. Furthermore, area sources are the predominant source (91%) of PM₁₀ emissions.

In the mobile source category, emissions from on-road vehicles are much higher than those from off-road sources (about three to nine times) for all criteria pollutants, except for SO_x. This can be explained by the fact that the sulfur content in fuels used for off-road vehicles is relatively higher than those for on-road vehicles.

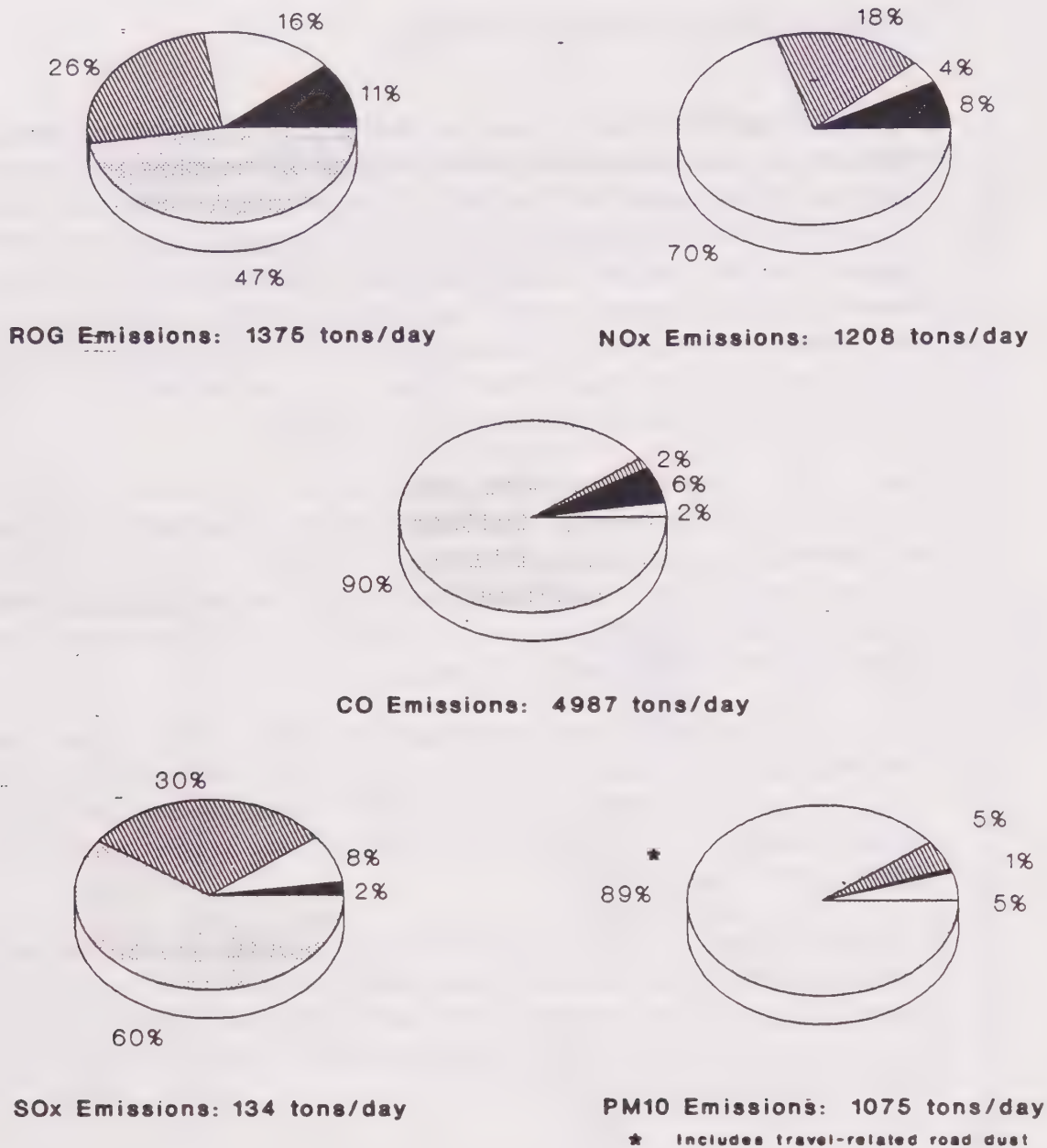
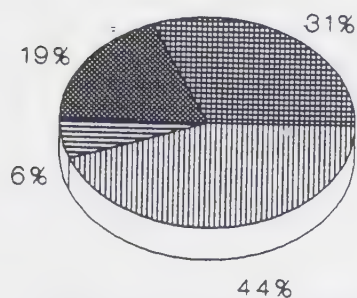
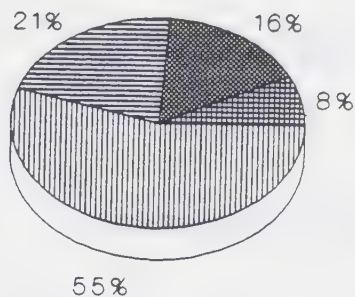


FIGURE 3-2
Relative Contribution by Consumer Sectors
to 1987 Annual Average Day Emissions

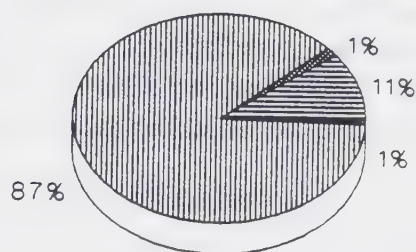
CHAPTER 3 CURRENT AND FUTURE EMISSIONS



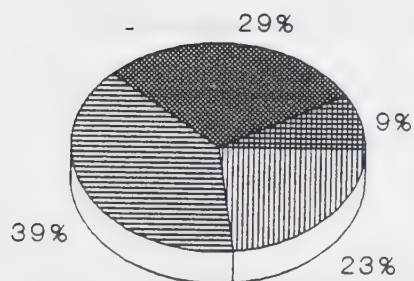
ROG Emissions: 1375 tons/day



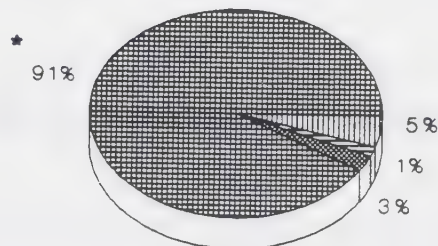
NOx Emissions: 1208 tons/day



CO Emissions: 4987 tons/day



SOx Emissions: 134 tons/day



PM10 Emissions: 1075 tons/day

★ Includes travel-related road dust



FIGURE 3-3
Relative Contribution by Source Category
to 1987 Annual Average Day Emissions

FUTURE EMISSIONS

Data Development

The years 1994, 1997, 2000, and 2010 are the target years for emission reductions under the California Clean Air Act. The forecast for these years was derived using (1) emissions from the base year 1987, (2) expected controls after implementation of District and ARB rules adopted prior to June 30, 1990, and (3) emissions growth in various source categories between the base and future years. Rules adopted after June 30, 1990 are treated as control measures (in Chapter 4) for emission reduction accounting purposes.

Demographic growth forecasts for various socio-economic categories (e.g., population, housing, employment by industries), developed by SCAG, were used to estimate future emissions. Table 3-2 summarizes key socio-economic parameters used in the emissions inventory development for the years 1987, 2000, and 2010. There is virtually no change in population and vehicle miles traveled (VMT) forecasts between the 1989 and the 1991 AQMPs. Growth factors for 1994 and 1997 were interpolated between 1987 and 2000 data.

Summary of Baseline Emissions

The average annual day emission data by major source categories are presented in Tables 3-3 through 3-6 for the years 1994, 1997, 2000, and 2010.

Impact of Growth

Despite the stringent air quality regulations adopted as of June 30, 1990, baseline emissions of ROG, NO_x, SO_x, and PM₁₀ will not decrease appreciably between the years 1987 and 2010. This is a consequence of regional growth in population, housing, and motor vehicle use. Motor vehicle regulations adopted by the ARB in September 1990 will decrease

TABLE 3-2
Baseline Socio-economic Forecasts for
the South Coast Air Basin*

Socioeconomic Category	Year				
	1987	2000	(% Growth)	2010	(% Growth)
Population (Millions)	12.0	14.3	(+19)	15.7	(+31)
Housing Units (Millions)	4.4	5.5	(+25)	6.1	(+39)
Total Employment (Millions)	6.0	7.4	(+22)	8.2	(+36)
VMT (Millions Miles)	240.1	323.5	(+35)	387.6	(+62)
In Use Vehicles (Millions)	7.9	9.2	(+17)	10.3	(+31)
Vehicle Trips (Millions)	29.2	35.3	(+21)	40.0	(+37)

* No AQMP measures included

TABLE 3-3

Summary of Emissions
By Major Source Category: 1994 Base Year
Average Annual Day (tons/day)

<u>Source Category</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SOX</u>	<u>PM10</u>
Stationary Sources					
Fuel Combustion	18	219	92	14	16
Waste Burning	1	2	4	0	1
Solvent Use	392	0	0	0	2
Petroleum Process, Storage & Transfer	88	7	7	20	3
Industrial Processes	41	10	7	7	47
Misc Processes*	64	1	6	0	1,130
Total Stationary Sources	604	239	116	41	1,199
Mobile Sources					
On-Road Vehicles	367	479	3,120	28	47
Off-Road Mobile	91	260	606	55	15
Total Mobile Sources	458	739	3,726	83	62
Total	1,062	978	3,842	124	1,262

* Travel-related road dust included

TABLE 3-4

Summary of Emissions
By Major Source Category: 1997 Base Year
Average Annual Day (tons/day)

<u>Source Category</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SOX</u>	<u>PM10</u>
Stationary Sources					
Fuel Combustion	18	180	97	16	17
Waste Burning	1	2	4	0	1
Solvent Use	391	0	0	0	2
Petroleum Process, Storage & Transfer	89	7	7	20	3
Industrial Processes	42	10	7	6	47
Misc Processes*	66	1	6	0	1,210
Total Stationary Sources	607	200	121	42	1,280
Mobile Sources					
On-Road Vehicles	318	448	2,682	25	47
Off-Road Mobile	94	268	638	57	16
Total Mobile Sources	412	716	3,320	82	63
Total	1,019	916	3,441	124	1,343

* Travel-related road dust included

TABLE 3-5

Summary of Emissions
By Major Source Category: 2000 Base Year
Average Annual Day (tons/day)

<u>Source Category</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SOx</u>	<u>PM10</u>
Stationary Sources					
Fuel Combustion	18	172	101	17	17
Waste Burning	1	2	4	0	1
Solvent Use	396	0	0	0	2
Petroleum Process, Storage & Transfer	90	7	7	20	3
Industrial Processes	42	10	7	7	47
Misc Processes*	68	1	7	0	1,291
Total Stationary Sources	615	192	126	44	1,361
Mobile Sources					
On-Road Vehicles	293	450	2,337	26	49
Off-Road Mobile	98	276	655	57	17
Total Mobile Sources	391	726	2,992	83	66
Total	1,006	918	3,118	127	1,427

* Travel-related road dust included

TABLE 3-6

Summary of Emissions
By Major Source Category: 2010 Base Year
Average Annual Day (tons/day)

<u>Source Category</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SOx</u>	<u>PM10</u>
Stationary Sources					
Fuel Combustion	21	183	107	14	20
Waste Burning	1	2	6	0	2
Solvent Use	419	0	0	0	2
Petroleum Process, Storage & Transfer	93	7	7	20	3
Industrial Processes	42	10	7	6	48
Misc Processes*	83	1	8	0	1,424
Total Stationary Sources	659	203	135	40	1,499
Mobile Sources					
On-Road Vehicles	296	494	1,831	29	56
Off-Road Mobile	110	300	752	61	18
Total Mobile Sources	406	794	2,583	90	74
Total	1,065	997	2,718	130	1,573

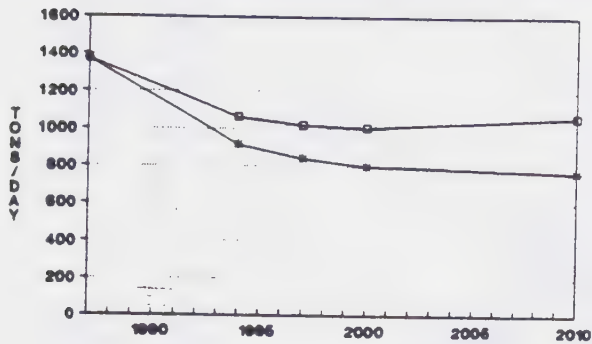
* Travel-related road dust included

baseline CO emissions by almost 50 percent by the year 2010. Figure 3-4 shows the effect of regional growth on future average annual day emissions. If the effects of growth were removed, the emission reduction benefits of existing rules and regulations will be more pronounced. In the case of PM₁₀, the growth in emissions will completely erode the expected emission reductions.

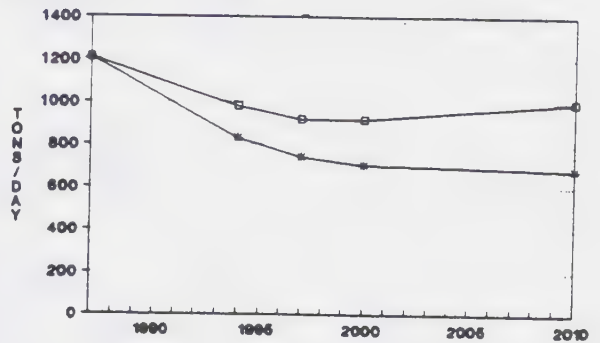
The impact of growth on emissions is particularly important in light of the CCAA requirements that emission reductions are calculated based on 1987 emissions. Therefore, increases in emissions caused by growth need to be fully offset in order to meet the CCAA requirements.

The spatial distributions of net changes in emissions of ROG, NO_x, and CO between the years 1987 and 2010 are shown in Figures 3-5 through 3-7. The degree of changes in emissions is indicated by color gradient. ROG, NO_x, and CO emissions are expected to decrease significantly in the western part of the Basin, but are predicted to increase in the east.

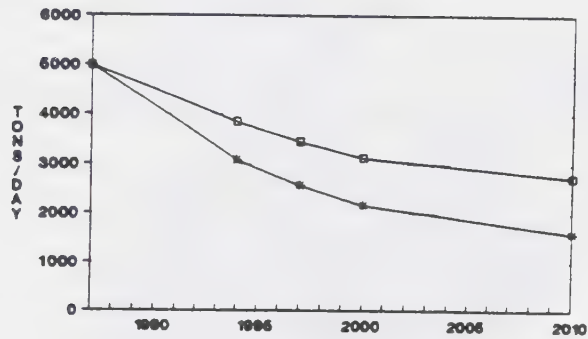
□ With Growth * Without Growth



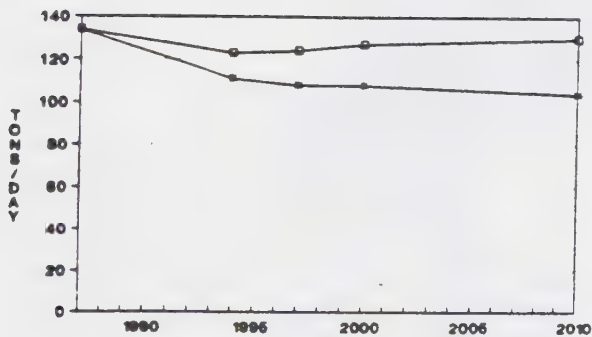
ROG Emissions



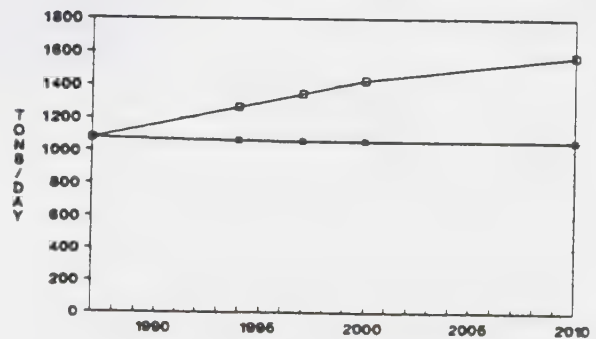
NOx Emissions



CO Emissions



SOx Emissions



PM10 Emissions

FIGURE 3-4

Emission Trends With and Without Growth

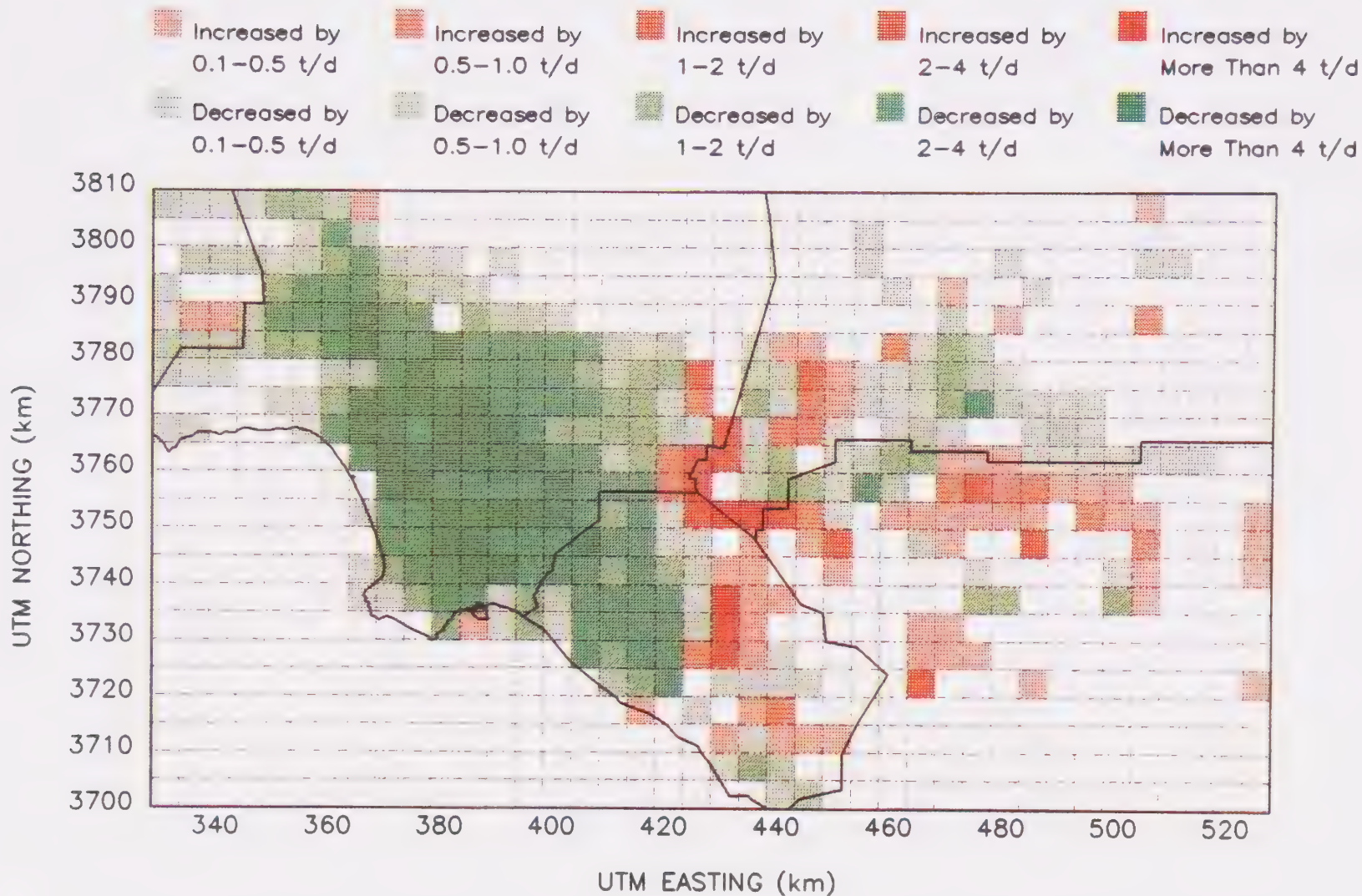


FIGURE 3-5

Change in Spatial Distribution of ROG Emissions
Between the Years 1987 and 2010

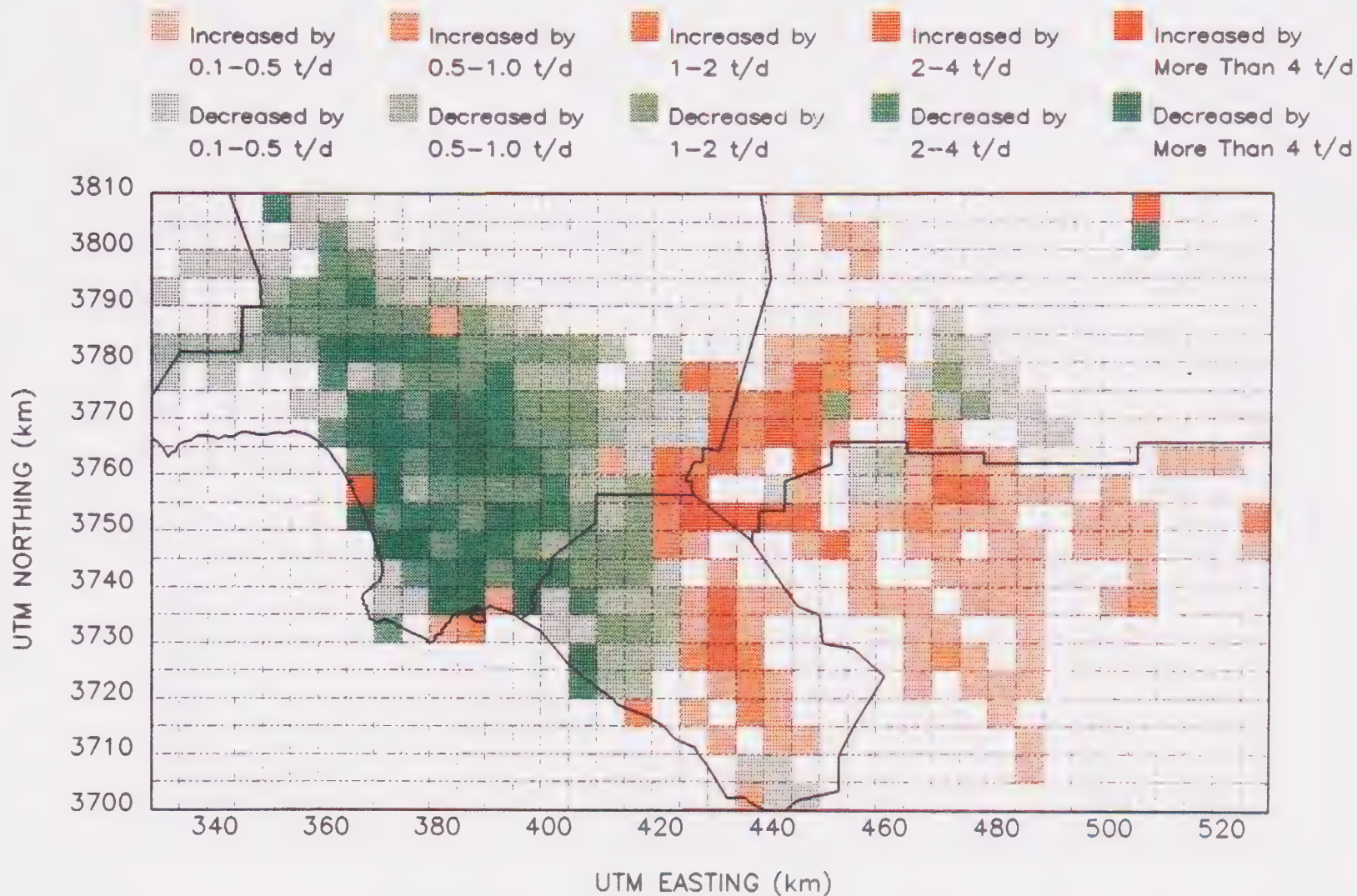


FIGURE 3-6

Change in Spatial Distribution of NO_x Emissions
Between the Years 1987 and 2010

3 - 18

July, 1991

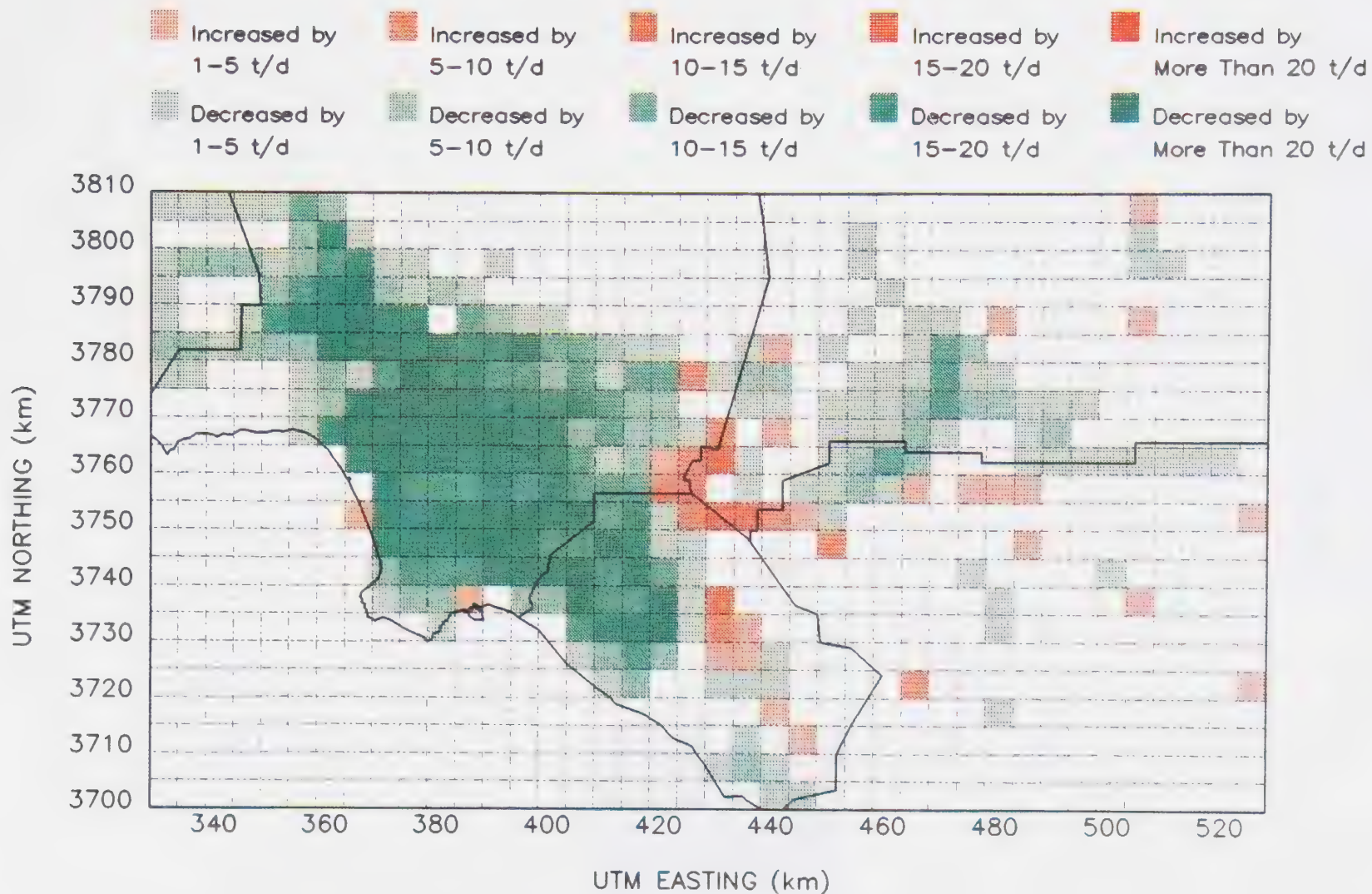


FIGURE 3-7

Change in Spatial Distribution of CO Emissions
Between the Years 1987 and 2010

IV

AQMP CONTROL STRATEGY





Auto-body painter uses HVLP spray gun

Aiming High for A Brighter Horizon

Targeting improved air quality means that even the application of paints and coatings must take on a new look. High Volume/Low Pressure (HVLP) spray-gun equipment—as developed by Binks Manufacturing Company—covers the intended surface more efficiently. This spares our atmosphere from excessive harmful fumes.

The South Coast Air Quality Management District is turning to the paints and coatings industry to load up on new technological breakthroughs—including coating formulas that reduce or eliminate volatile organic compounds.

CHAPTER 4

AQMP CONTROL STRATEGY

Introduction

Stationary Source Control Strategies

**Mobile Sources, Transportation-Related and Land Use-Related
Control Strategies**

Market Incentives

Economic Impacts

INTRODUCTION

This chapter presents the overall emissions control strategy for stationary and mobile sources. This strategy is built on the attainment strategy contained in the 1989 AQMP. New data and analytical methods resulted in information which reinforces the basic strategy adopted in 1989.

Control methods are categorized into three tiers, depending upon their readiness for implementation. The three tiers are as follows:

Tier I- Full implementation of known technological applications and effective management practices. Adoption and implementation within the next few years.

Tier II- Significant advancement of today's technological applications and vigorous regulatory intervention. Adoption and implementation within the next ten to fifteen years.

Tier III- Development of new technology. Development, adoption, and implementation within the next twenty years.

The stationary source component of the overall strategy is divided into point and area source measures. The mobile source component is divided into on-road, off-road, and indirect source measures.

Fifty-four new measures have been identified since the 1989 AQMP and incorporated herein. Of these new measures 21 are associated with stationary sources, 25 with mobile sources, and 8 with indirect sources. All control methods potentially available for implementation by 2010 were identified and, to the extent possible, quantified. The quantified measures were modeled to determine their effectiveness in meeting the attainment goals.

Table 4-1 and Figures 4-1A through 4-1E demonstrate the emission reductions proposed in this Plan as a function of the tiers. The effectiveness of the overall control strategy on air quality improvement is shown in Chapter 5.

TABLE 4-1

Summary of Annual Average Emission Reductions
(Tons/Day)

Sources	ROG	NOx	Pollutant CO	SOx	PM10
Year 2010 Baseline	1065	997	2718	130	1572
Tier I Emission Reductions (1)					
Stationary					
Area	226	27	11	0	521
Point	32	76	1	21	18
Transportation					
On-Road	222	285	1086	10	18
Off-Road	46	158	201	40	6
Total for Tier I	526	546	1299	71	563
Tier II Emission Reductions					
Stationary					
Area	121	18	15	1	125
Point	68	9	1	4	1
Transportation					
On-Road	0	0	0	0	0
Off-Road	6	0	25	0	0
Total for Tier II	195	27	41	5	126
Tier III Emission Reductions					
Stationary					
Area	91	2	9	0	26
Point	60	0	0	3	1
Transportation					
On-Road	0	0	0	0	0
Off-Road	14	48	50	0	1
Total for Tier III	165	50	59	3	28
Year 2010 Remaining Emissions	179	374	1319	51	855

(1) Includes emission reductions from rules and regulations adopted between July 1, 1990 and April 30, 1991.

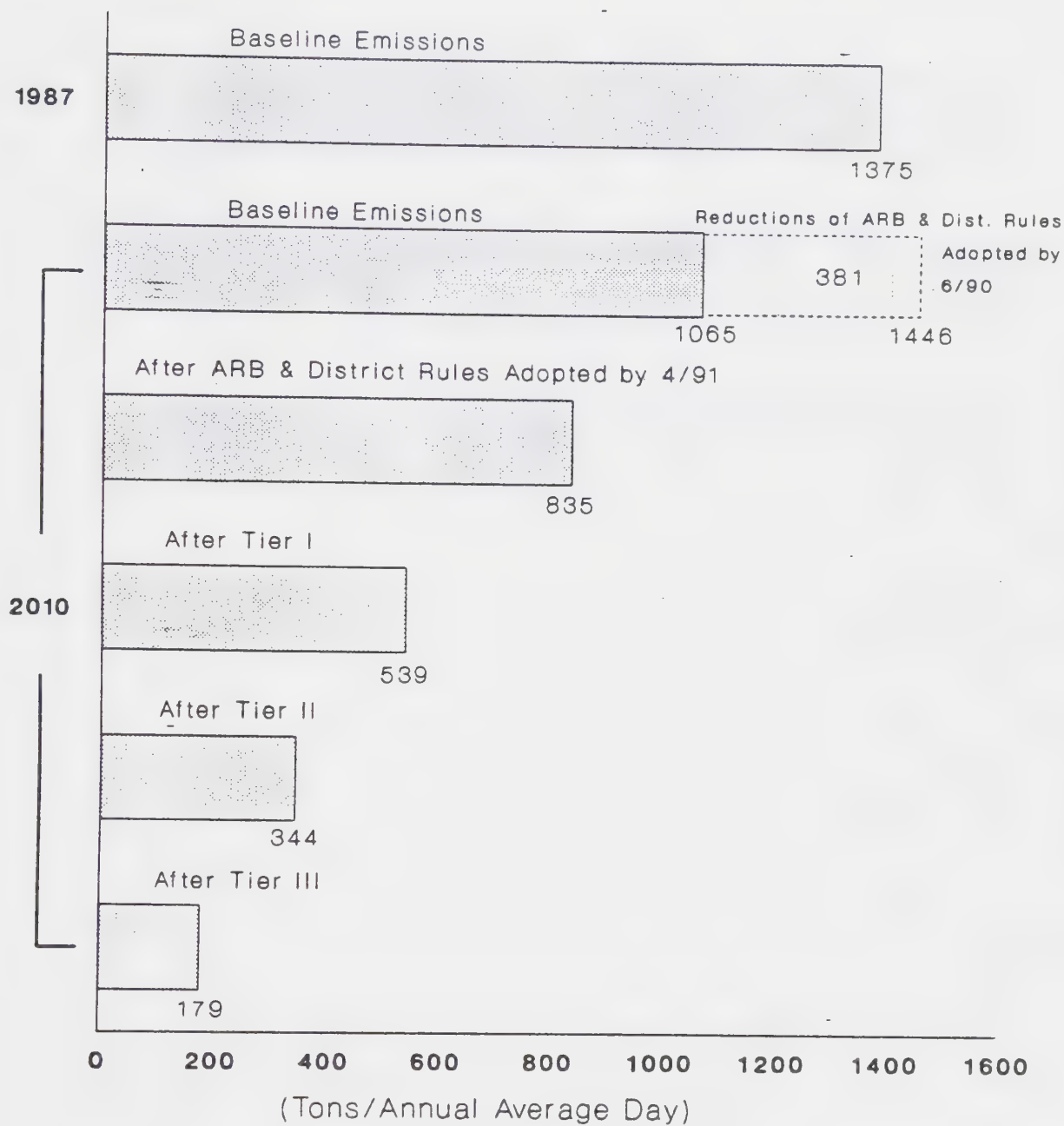


FIGURE 4-1A
1991 AQMP Emissions Profile -- ROG

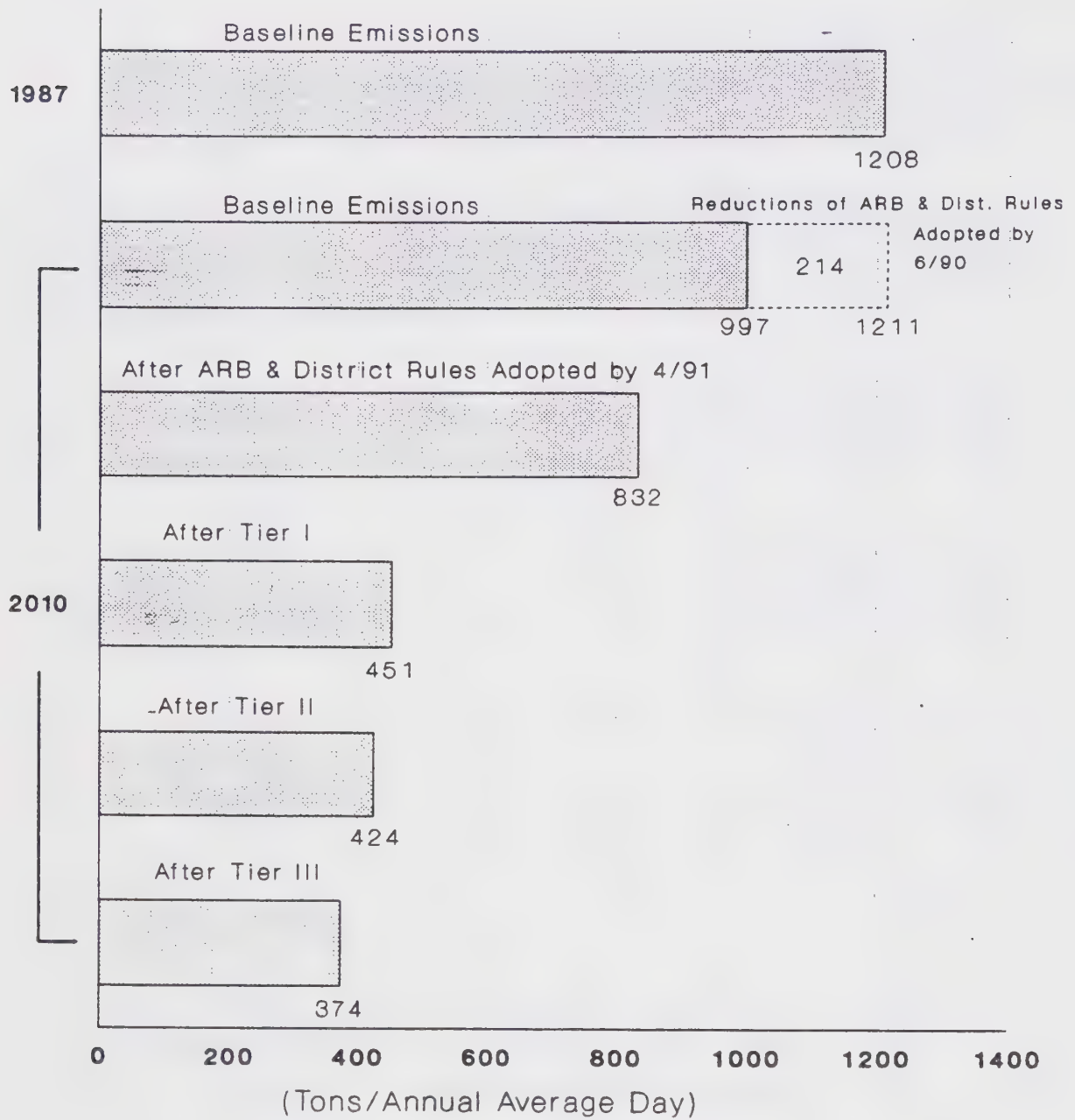


FIGURE 4-1B
1991 AQMP Emissions Profile -- NOx

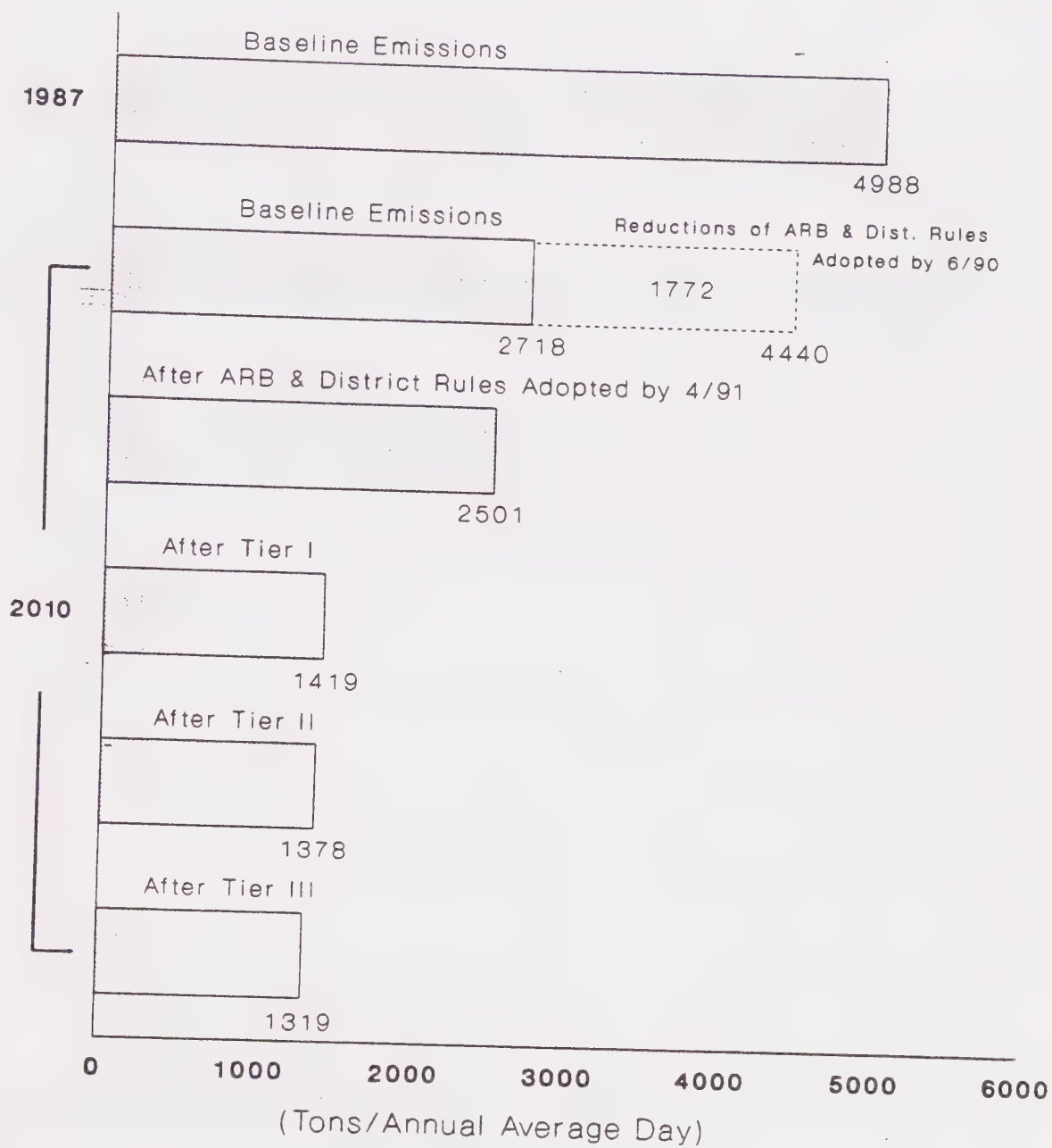


FIGURE 4-1C
1991 AQMP Emissions Profile -- CO

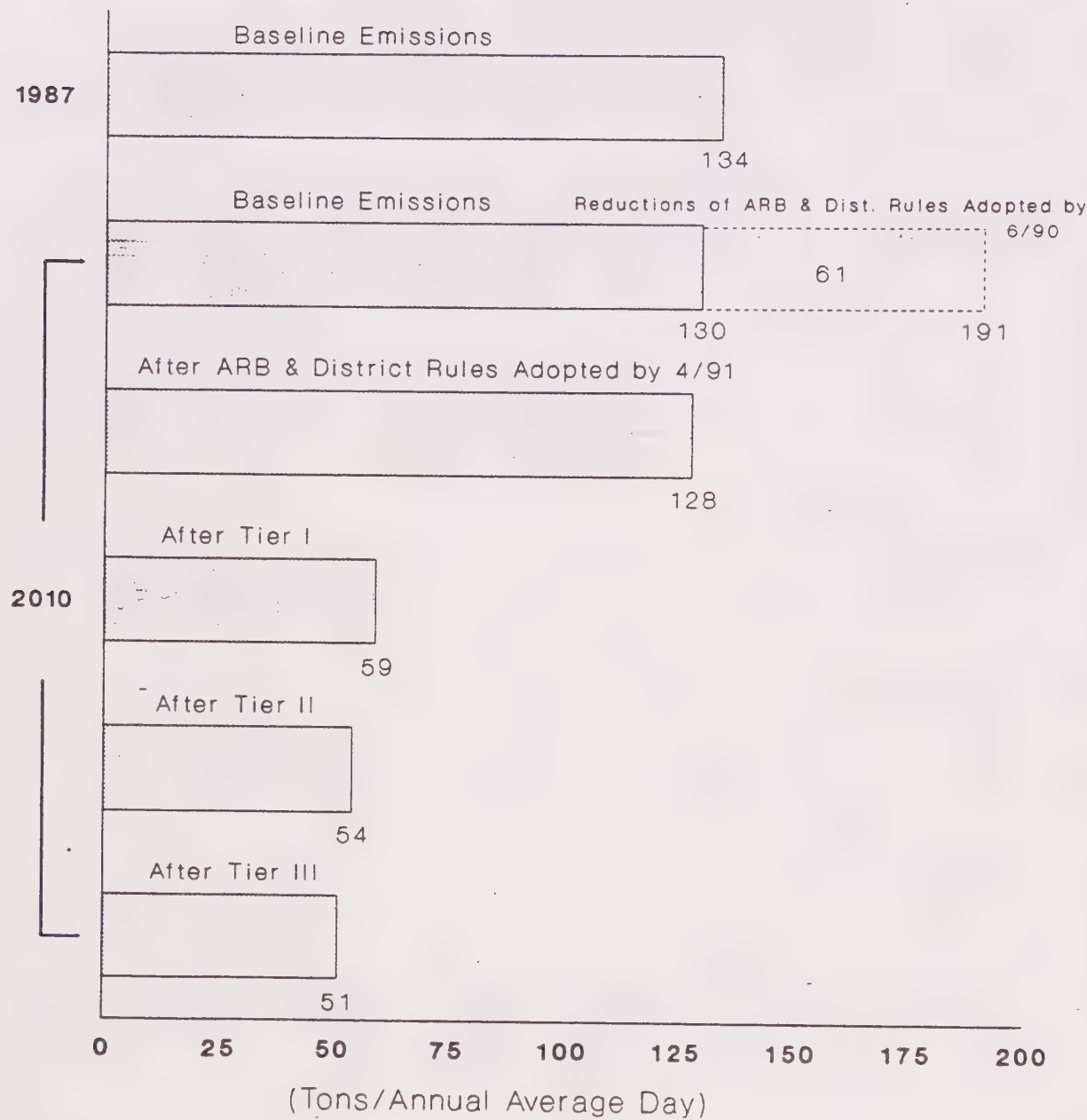


FIGURE 4-1D
1991 AQMP Emissions Profile -- SOx

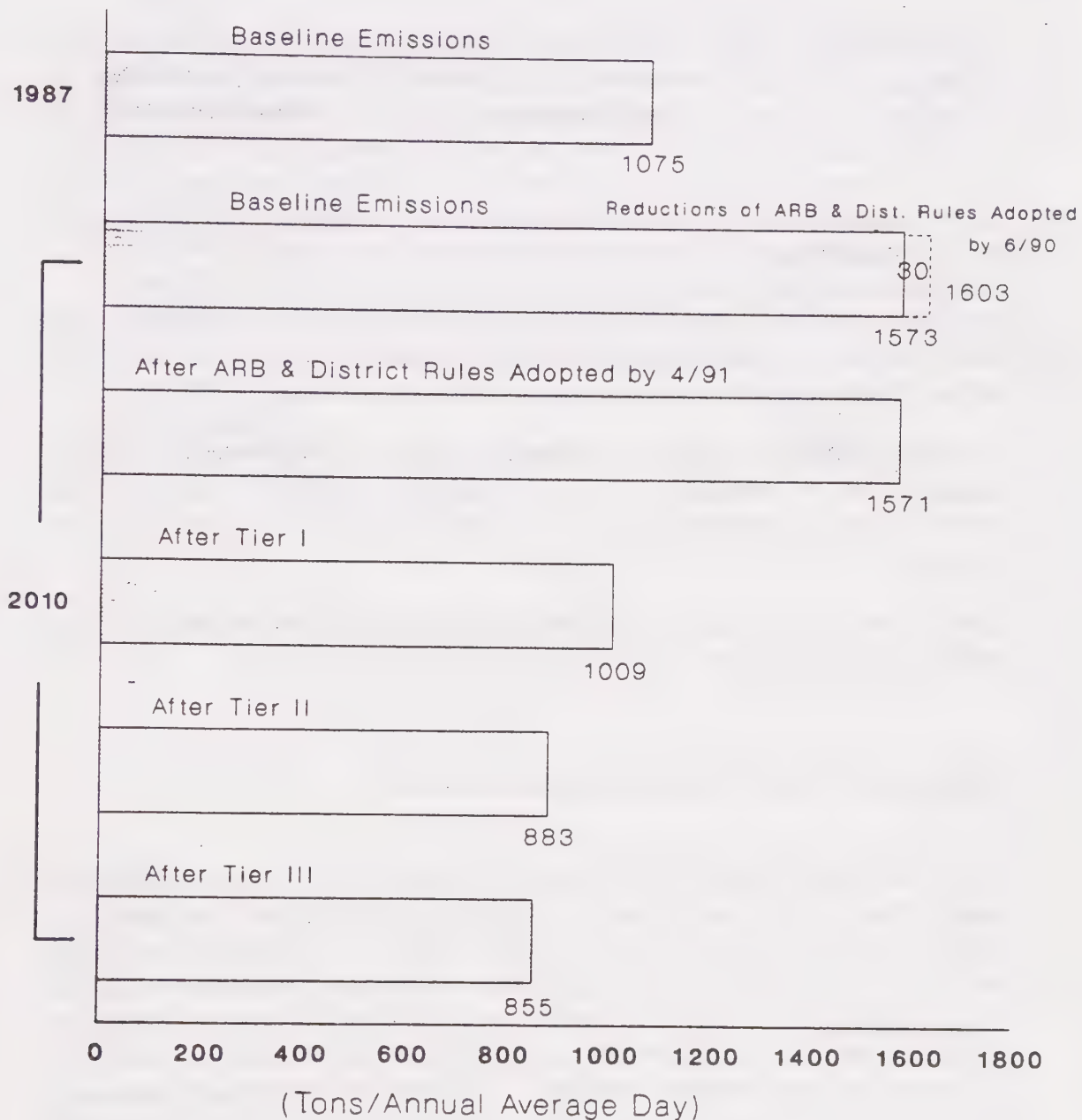


FIGURE 4-1E
1991 AQMP Emissions Profile -- PM10

STATIONARY SOURCE CONTROL STRATEGIES

If no additional emission controls are adopted, it is projected that in 2010 stationary sources will contribute 62 percent of the ROG emissions, 20 percent of the NO_x emissions, 5 percent of the CO emissions, 31 percent of the SO_x emissions, and 95 percent of the PM₁₀ emissions. Because these sources constitute a significant portion of the total emissions inventory, it is important to obtain the maximum emission reductions in order to achieve the ambient air quality standards.

Since the adoption of the 1989 AQMP, a total of 34 control measures have been adopted by the District or ARB, resulting in significant emission reductions in the year 2010 as shown in Figures 4-1A through 4-1E.

The 1991 AQMP proposes to continue the adoption of the remaining Tier I stationary control measures, as well as to pursue technological and legislative advancements to bring about the implementation of Tier II targets and Tier III goals.

The following describes the methodologies for reducing emissions from the two segments of stationary sources, i.e., point and area sources.

Stationary Point Source Control Strategy

There are approximately 50,000 stationary point sources located within the Basin. Point sources are defined as emissions at a facility with an identified location (e.g., power plants and refinery boilers). Emissions from these sources are to be reduced by application of control measures in Tier I, control targets in Tier II, and control goals in Tier III. On a composite pollutant basis, Tier I reduces 31 percent, Tier II - 17 percent, and Tier III - 13 percent of the baseline emissions. The emission reductions associated with the proposed controls for point sources are shown in Table 4-2 and Figure 4-2. It should be noted that most of the stationary source CO emission reductions are obtained from area sources rather than point sources.

A total of 29 Tier I control measures have been proposed to reduce emissions from point sources. Ten of these measures are new to this AQMP revision; the remaining measures have been carried over from the 1989 AQMP. The latter group of measures have not yet been adopted as rules and are scheduled for adoption in the next few years. The listing of Tier I control measures and their proposed dates of adoption and implementation are shown in Chapter 7.

Table 4-2 contains the general description of the stationary point Tier I control measures and the associated cost-effectiveness range. In addition, the targets of Tier II and the goals of Tier III for point sources are shown in Table 4-2. Details of the proposed Tier I control measures, Tier II targets, and Tier III goals are presented in Appendix IV-A. Tier I energy conservation and waste recycling control measures are presented in Appendix IV-D.

TABLE 4-2

Emission Reduction Strategies to Reduce Point-Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTION (T/AAD)					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10		
I	Surface Coating and Solvent Use	Reformulation	5	—	—	—	—	4	\$5,000 to \$19,000
		Higher Transfer Efficiency							
		Process Improvements							
		Add-On Controls							
		Alternative Coating Methods and Solvents							
I	Petroleum and Gas Production	Process Modifications	4	3	—	11	3	7	\$2,000 to \$50,000
		Add-On Controls							
		Alternative Fuels							
		I/M Programs							
I	Industrial and Commercial Processes	Combustion Modification	2	17	—	—	11	12	Savings to \$62,000
		Alternative Fuels							
		Add-On Controls							
		Process Improvements							

TABLE 4-2 (Continued)

Emission Reduction Strategies to Reduce Point-Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10		
I	Residential and Public Sectors	Industrial Energy Conservation							
		Paper/Glass Recycling							
		Industrial Effluent Discharge Limits	*	---	---	---	---	1	*
	Other Point Sources	Add-On Controls							
		Phase-Out of Fuel Oil and Solid Fossil Fuels	---	22	---	7	3	3	\$7000 to \$30,000
		Emission Minimization Management Plan							
		Marketable Permits Program							
II	Surface Coating and Solvent Use (50% Reduction Beyond Tier I)	Low-ROG Coatings and Solvents	60	0	0	0	0	**	**
		Emission Charges							

* To be determined later.

** As information becomes available, specific measures and their cost-effectiveness will be determined.

TABLE 4-2 (Continued)

Emission Reduction Strategies to Reduce Point-Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NO _x	CO (T/AAD)	SO _x	PM ₁₀		
II	Other Stationary Sources (50% Reduction Beyond Tier I)	Application of BARCT Emission Charges	5	8	0	4	0	*	*
II	Petroleum Refining (25% Reduction Beyond Tier I)	Export Fees	2	1	1	0	1	*	*
III	Surface Coating and Solvent Use (90% Reduction Beyond Tier II)	Low-ROG Coatings and Solvents Emission Charges	48	0	0	0	0	*	*
III	Other Stationary Sources (75% Reduction Beyond Tier II)	Application of BARCT Emission Charges	4	0	0	3	0	*	*

* As information becomes available, specific measures and their cost-effectiveness will be determined.

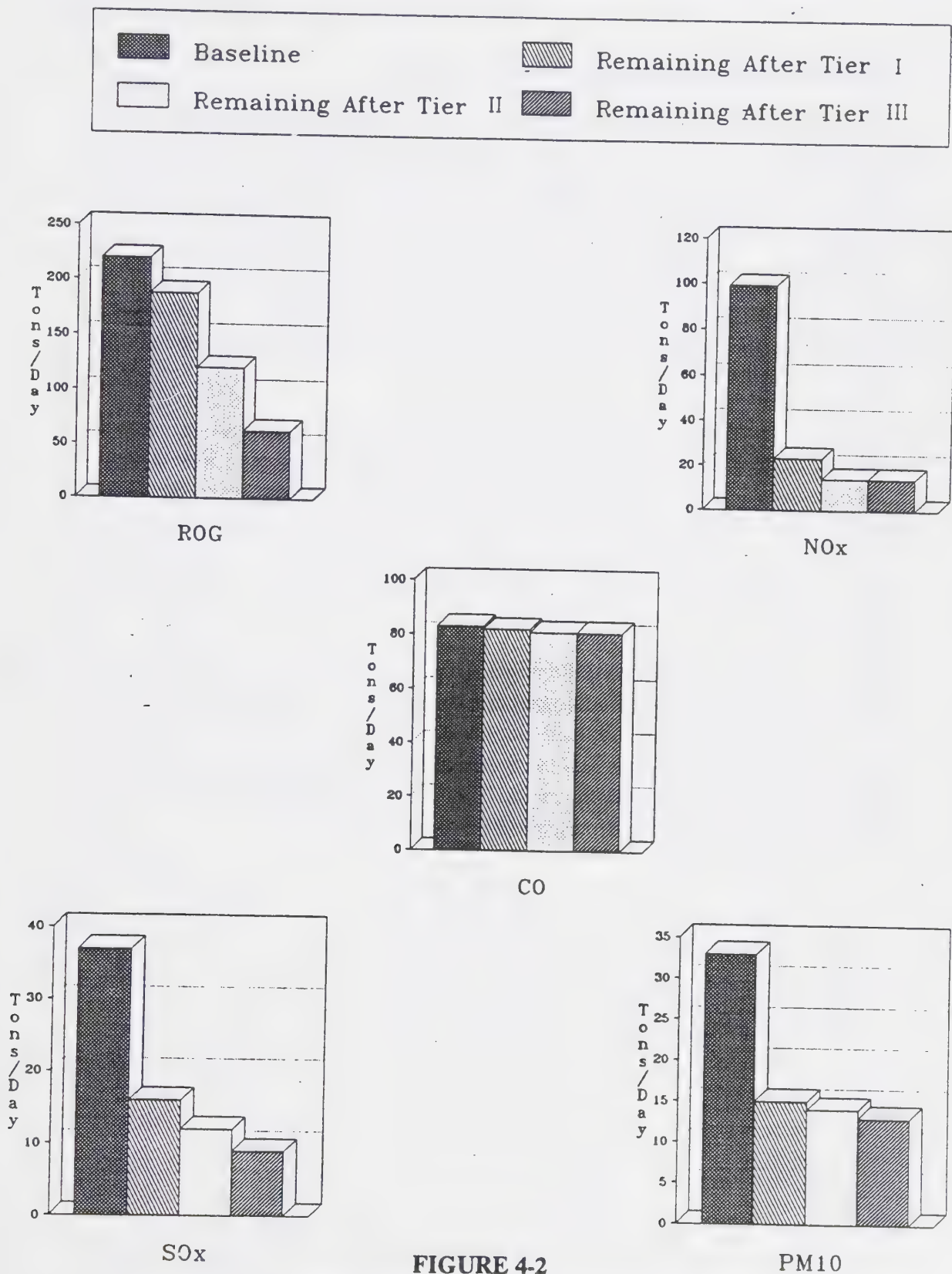


FIGURE 4-2
Stationary Point Source Emission Profiles

Stationary Area Source Control Strategy

Stationary area sources are defined as emissions from small facilities, pieces of equipment, or other sources of emissions, with locations which are not specifically identified (e.g., domestic products and gasoline service stations). Emissions from these sources are to be reduced by application of control measures in Tier I, control targets in Tier II, and control goals in Tier III. On a composite pollutant basis, Tier I reduces 38 percent, Tier II - 14 percent, and Tier III - 6 percent of the baseline emissions. The emission reductions associated with the proposed controls for area sources are shown in Table 4-3 and Figure 4-3.

A total of 37 Tier I control measures have been proposed to reduce emissions from area sources. Eleven of these measures are new to this AQMP revision, the remaining measures have been carried over from the 1989 AQMP. The latter group of measures have not yet been adopted as rules and are scheduled for adoption in the next few years. The listing of Tier I control measures and their proposed dates of adoption and implementation are shown in Chapter 7.

Table 4-3 contains the general description of the Tier I area source control measures and the associated cost-effectiveness range. In addition, the targets of Tier II and the goals of Tier III for area sources are shown in Table 4-3. Details of the proposed Tier I control measures, Tier II targets, and Tier III goals are presented in Appendix IV-B. Tier I energy conservation and waste recycling control measures are presented in Appendix IV-D.

TABLE 4-3

Emission Reduction Strategies to Reduce Area Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10 (T/AAD)		
I	Surface Coating and Solvent Use	Reformulation Emission Charges Process Improvements Alternative Application Methods and Solvents Waste Minimization	46	--	--	--	--	4	\$300
I	Petroleum and Gas Production	Phase I and II Vapor Recovery Systems Improved Vapor Recovery Systems Utility Engine Refueling Operations Improved Fuel Shut-Off Mechanism	18	--	--	--	--	9	\$130 to \$2,300

TABLE 4-3 (Continued)

Emission Reduction Strategies to Reduce Area Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10 (T/AAD)		
I	Industrial and Commercial Processes		8	10	0.4	0.1	9	9	Savings to \$4,700
		Combustion Modification							
		Alternative Fuels							
		Add-On Controls							
		Process Improvements							
I	Residential and Public Sectors	Commercial Energy Conservation							
			0.4	14	4	0.3	296	7	Savings to \$10,000
		Out-Of-Basin Waste Transport							
		Solar Collectors							
		Combustion Modification							
		Residential Energy Conservation							
		Local Government Energy Conservation, Waste Recycling							
		Road Dust Suppression							

TABLE 4-3 (Continued)

Emission Reduction Strategies to Reduce Area Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NO _x	CO	SO _x	PM ₁₀		
I	Agricultural Processes	Alternative Formulation and Application Methods	19	—	—	—	12	3	\$550 to \$1,300
		Alternative Disposal Methods							
I	Other Area Sources	Improved Housekeeping Procedures							\$700 to \$23,000
		Process Modifications							
I	Other Area Sources	Best Available Retrofit Control Technology (BARCT)	37	1	6	0	203	5	\$700 to \$23,000
		Low-Emitting Construction Methods and Materials							
II	Surface Coating and Solvent Use (50% Reduction Beyond Tier I)	Watering At Construction Sites							
		Windbreaks							
II	Surface Coating and Solvent Use (50% Reduction Beyond Tier I)	Low-ROG Consumer Prods	94	0	0	0	0	*	
		Low-ROG Coatings and Solvents							
II	Surface Coating and Solvent Use (50% Reduction Beyond Tier I)	Emission Charges							

* As information becomes available, specific measures and their cost-effectiveness will be determined.

TABLE 4-3 (Continued)

Emission Reduction Strategies to Reduce Area Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10 (T/AAD)		
II	Paved Roads Dust (20% Reduction Beyond Tier I)	Require Paving at the Areas Adjacent to Roadways Early Paving at Construction Sites Install Liners on Truck Beds	0	0	0	0	86	*	*
II	Other Stationary Sources (50% Reduction Beyond Tier I)	Application of BARCT Emission Charges	28	19	15	2	38	*	*
III	Surface Coating and Solvent Use (90% Reduction Beyond Tier II)	Low-ROG Consumer Prods Low-ROG Coatings and Solvents Emission Charges	79	0	0	0	0	*	*

* As information becomes available, specific measures and their cost-effectiveness will be determined.

TABLE 4-3 (Continued)

Emission Reduction Strategies to Reduce Area Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHOD	EMISSION REDUCTIONS (T/AAD)					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10		
III	Other Stationary Sources (75% Reduction Beyond Tier II)	Application of BARCT Emission Charges	14	2	9	0	27	*	*

* As information becomes available specific measures and their cost-effectiveness will be determined.

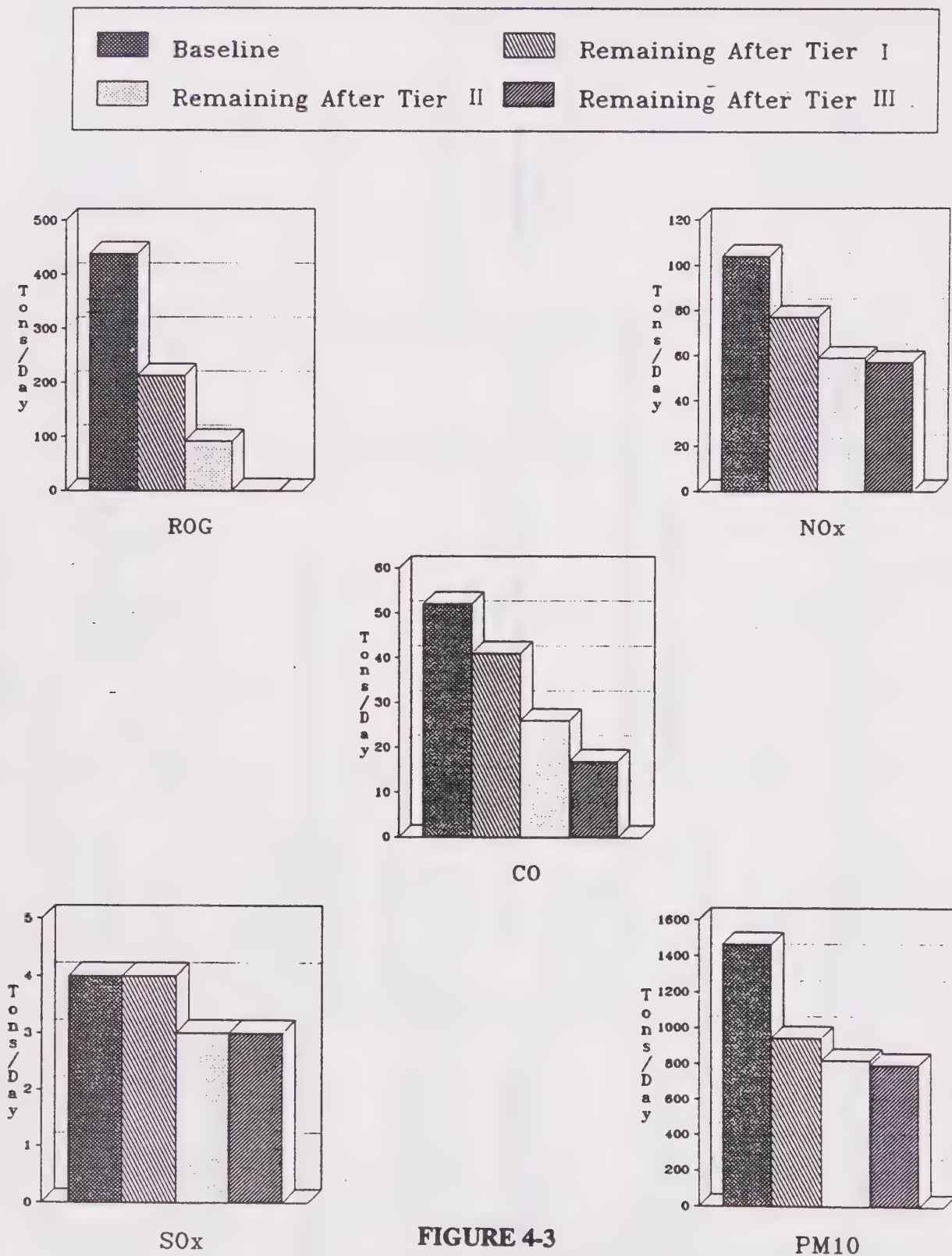


FIGURE 4-3
Stationary Area Source Emission Profiles

MOBILE SOURCES, TRANSPORTATION-RELATED, AND LAND USE-RELATED CONTROL STRATEGIES

Mobile- and transportation-related sources produce the largest amount of pollutant emissions in the Basin. If no additional controls are adopted, it is estimated that in 2010 these sources will contribute 38 percent of ROG, 80 percent of NO_x, and 95 percent of CO emissions. These sources also emit significant amounts of SO_x and PM₁₀ emissions. Control of these emissions sources is essential in the effort to attain ambient air quality standards.

Since the development of the 1989 AQMP, a total of 10 control measures have been adopted by the ARB for on-road vehicles, resulting in significant emission reductions in the year 2010 (Figure 4-1A to 4-1E).

The 1991 AQMP proposes to continue the adoption of the remaining Tier I measures, as well as 33 new mobile source- and transportation-related control measures. In addition, emission reductions to be pursued through technological advancements and breakthroughs are identified in the form of Tier II targets and Tier III goals for off-road motor vehicles. A detailed discussion of specific Tier I, II, and III control measures is included in Appendices IV-C, IV-E, and IV-F.

The following sections describe strategies for reducing emissions from mobile and transportation-related sources. These sections are organized in terms of on-road and off-road motor vehicle control strategies.

On-Road Motor Vehicle Control Strategies

There are approximately 8 million on-road vehicles in the Basin. On-road motor vehicles include passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and motorcycles. In 1989, these vehicles traveled more than 240 million miles in the Basin.

The key approaches to reduce emissions from on-road motor vehicles include more stringent tail-pipe emission standards, less-polluting fuels, and reducing vehicle use (e.g., vehicle trips and vehicle miles traveled). The listing of Tier I control measures and their proposed dates of adoption and implementation are shown in Chapter 7. The emission reductions associated with the

proposed controls for on-road vehicles are summarized in Tables 4-4, 4-5, and 4-6, as well as Figure 4-4.

More Stringent Emission Standards and Less-Polluting Fuels

The AQMP proposes a fuel neutral strategy to reduce vehicle emissions through the establishment of more stringent emission and fuel quality standards. The ARB has primary authority for establishing such standards relative to on-road vehicles operated in California. However, the District has authority to promulgate on-road vehicle measures in select areas that are complementary to the ARB measures. These measures include operational modifications which can lead to emission reductions (e.g., limit curb idling), requiring the use of low-emission motor vehicles for fleet operators.

The on-road motor vehicle control strategy embodied in the 1991 AQMP is primarily based on the September 1990 ARB Low-Emission Vehicles and Clean Fuels rulemaking. That rulemaking established stringent tail-pipe standards and mandated low-emission vehicle sales for the years 1994 through 2003. The on-road motor vehicle control strategy incorporated herein extrapolates the ARB requirements to the year 2010.

The key features of this strategy include:

- (1) establishing vehicle emission standards that will require additional ROG and NO_x emission reductions of approximately 80 percent and 50 percent, respectively, relative to current emission standards,
- (2) requiring the sale of *zero-emission vehicles* beginning in 1998,
- (3) allowing the use of vehicles powered by alternate fuels, and
- (4) requiring the widespread availability of alternate fuels, based on the number of alternate-fueled vehicles produced by automobile manufacturers.

TABLE 4-4

Emission Reduction Strategies to Reduce On-Road Motor Vehicle Emissions

TIER	SOURCE CATEGORY	CONTROL METHODOLOGY	EMISSION REDUCTIONS*					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO (T/AAD)	SOx	PM10		
I			195	205	684	2	1	12	N/A
					(ARB Control Measures)				
			1	6	8	—	2	12	Savings to \$30,000
					(District Control Measures)				
	Passenger Cars	Reduction of In-Use Emissions							
	Light-Duty Trucks	More Stringent Standards							
	Medium-Duty Vehicles	Use of Clean Fuels and							
	Heavy-Duty Vehicles	Low Emission Vehicles							
	Urban Buses								

* Gross emission reductions excluding overlap amongst control measures.

TABLE 4-5

Transportation System and Land Use Strategies to Reduce On-Road Mobile Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHODOLOGY	EMISSION REDUCTIONS*					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10 (T/AAD)		
1	Passenger Cars Light-Duty Trucks Medium-Duty Vehicles Heavy-Duty Vehicles Urban Buses	VMT Reduction Facility Improvements Growth Management Congestion Relief Mode Shift	103	136	629	12	16	11	N/A
			(SCAG Control Measures)						

* Gross emission reductions excluding overlap amongst control measures.

TABLE 4-6

Emission Reduction Strategies to Reduce Indirect Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHODOLOGY	EMISSION REDUCTIONS*					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10		
I	Passenger Cars	Mitigation Measures	11	12	72	1	2	8	N/A
	Light-Duty Trucks	Trip and VMT Reduction							
	Medium-Duty Vehicles	Truck Programs							
	Heavy-Duty Vehicles								

* Gross emission reductions excluding overlap amongst control measures.

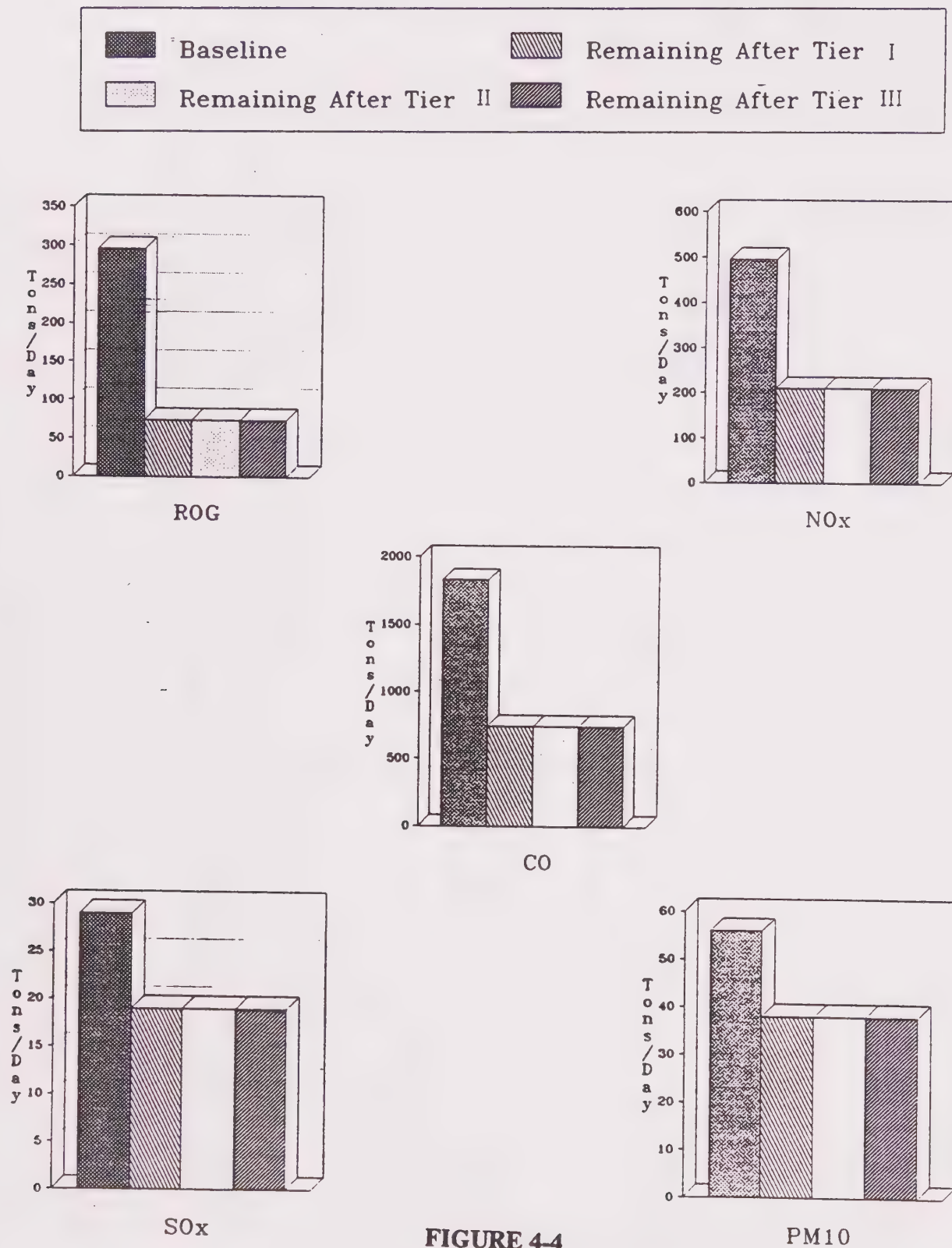


FIGURE 4-4
Mobile On-Road Emission Profiles

The on-road motor vehicle control strategy will most likely result in significant use of alternate-fueled vehicles. The District and ARB have estimated potential alternate-fueled vehicle penetrations for the year 2010 based on this strategy. These estimates, which are characterized by vehicle miles traveled (VMT) and overall fleet penetration for each alternate-fueled vehicle type, are shown in Tables 4-7 and 4-8.

It is important to note that ARB's Low-Emission Vehicle and Clean Fuels rulemaking and the extrapolation of this rulemaking through the year 2010 replaces the 1989 AQMP's Tier II and III low-emission and extremely low-emission vehicle control measures. The ARB low-emission vehicle control measures further define the emission control technology, fuel specifications, emissions standards, and implementation schedule needed to achieve the goal of near-zero emission levels from all in-use vehicles operating in the Basin. This goal reflects the principal intent of the 1989 AQMP Tier II and III on-road vehicle control measures.

ARB's Low-Emission Vehicle and Clean Fuels control measures also provide a new approach in reducing on-road motor vehicles emissions; for the first time, a vehicle and its fuel are treated as a system in the effort to attain compliance with exhaust emission standards. This approach will provide flexibility and promote cooperation between the vehicle manufacturers and fuel suppliers to develop the least polluting vehicle emission control system/clean fuel combination.

A key control strategy that must be considered in the overall effort to identify the best emission control system/ clean fuel combination is the use of oxygenated fuels. The 1990 Federal Clean Air Act Amendments requires gasoline to contain 2.7 percent oxygen by weight for areas which are prone to high ambient CO concentrations during winter months. It should be noted, however, that EPA could waive this requirement in whole or in part based on a number of factors, including oxygenated gasoline interfering with attainment of federal and/or state ambient air quality standards.

TABLE 4-7

Motor Vehicle VMT Penetration Assumptions for 2010
(percent)

Vehicle Class	Electric	Alternate Fuels*	Gasoline	Diesel
Passenger Cars	17	33	50	0
Light-Duty Trucks	9	38	53	0
Medium-Duty Vehicles	0	40	57	3
Heavy-Duty Vehicles	0	24	29	47
Urban Buses	30	70	0	0
Locomotives	90	0	0	10

* Alternative fuels under consideration include methanol, LPG, and natural gas.

Note: ARB developed penetrations for passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty vehicles. The District developed penetrations for urban buses and locomotives.

TABLE 4-8

Penetration Assumptions for Year 2010 Motor Vehicle Fleet
(number of vehicles on the road in thousands)

Vehicle Class	Electric*	Alternative** Fuels	Gasoline	Diesel
Passenger Cars	1,130	2,200	3,760	0
Light-Duty Vehicles	210	670	990	0
Medium-Duty Vehicles	0	200	330	20
Heavy-Duty Vehicles	0	70	100	240
Urban Buses	1	2	0	0

* Includes dedicated electric and hybrid electric vehicles.

** Alternative fuels under consideration include methanol, LPG, and natural gas.

Transportation and Land Use Control Strategies

The 1991 AQMP includes twenty-four SCAG Tier I transportation and land-use measures which are modifications of the measures in the 1989 AQMP. The measure titles and numbers for the most part are the same.

The most important modifications identify (1) market incentives as supplementary options for implementing some measures as proposed by the Growth Management and Transportation Task Force and (2) the choice of using one or more of these implementing techniques for implementing some measures: local ordinances, regional regulations, and/or market incentives. The other modifications pertain to due dates, more specific phasing, emission reduction targets, improving enforceability, funding committed for implementation of measures, operational feasibility, and relationship between SCAG measures and SCAQMD's regulation XV and other indirect source control strategies. The SCAG measures continue to be an integral part of SCAG's Regional Mobility and Growth Management Plans.

Market incentive implementation techniques are incorporated into Person Work Trip Reduction, 1a, Parking Management, 2b, HOV Facilities, 2f, Transit Improvements, 2g, Truck Dispatching, Rescheduling, and Rerouting, 3a, Rail Electrification, 14, and Growth Management, 17. In Appendix IV-E, Further Studies Issues, market incentives are addressed under User Fees, including congestion pricing, and auto buyback.

The 1991 revision includes a few other changes. Alternative Work Weeks and Flextime as well as Telecommunications (1a and 1b in the 1989 AQMP) have been combined into Person Work Trip Reduction, 1a. Non-Motorized Transportation, 1b, is new. It integrates and enhances components of non-work transportation which were in separate measures in the 1989 AQMP. Vanpool Purchase Incentives, 2c (1989), has been merged with Employer Rideshare and Transit Incentives, 2a.

Energy measures in the 1991 AQMP are in a separate energy appendix in accord with the direction of the interagency Energy Working Group. The appendix has been drafted by staff of the California Energy Commission (CEC), SCAG, SCAQMD, and various consultants. As a result, revisions of Local Government Energy Conservation, 18a, Waste Recycling, 18b, and Pricing, Tax, and Subsidy Incentives, 18c, are in the energy appendix. Electric Vehicles, measure 15, has been deleted due to the overlap with the

ARB and SCAQMD alternative fuels program. Electric vehicle technology is one of several types of available low-emission vehicle technologies.

While the control strategies have not changed, modifications have been made to the method of implementation for some of the transportation and land use control measures. These changes have resulted in a reduction in the vehicle miles traveled attributed to SCAG transportation and land use control measures from a 27 percent reduction in the 1989 AQMP to a 17 percent reduction in the 1991 AQMP. However, the emission reductions attributed to SCAG control measures remained the same due to a substantial decrease in vehicle hours traveled. Additional modifications to SCAG's control measures are summarized as follows:

- o Subregional vehicle miles traveled (VMT) equivalent targets are included as an implementation option to the jobs/housing balance ratios for the growth management control measure. The VMT targets can be met through transportation measures (in addition to the measures in the AQMP) and land use programs.
- o The list of facilities (transit, HOV, and highways) that are funding constrained and unconstrained has been modified to reflect the recent changes in funding as a result of Propositions 111, 108, and 116, and Measure I in San Bernardino County. Measures HOV Facilities, 2f, Transit Improvements, 2g, and Freeway and Highway Capacity Enhancements, 13, describe how the Regional Transportation Improvement Program (RTIP) identifies specific facilities, is a legally enforceable mechanism, and provides financial resources.
- o The target dates for implementation of several measures have been extended, including the Air Quality Element.
- o Market-based programs, such as replacement of free employee parking with a transportation allowance, and establishing a fee for trucks involved in freeway accidents, have been incorporated as implementation options into SCAG's control measures.
- o Pricing strategies are proposed as an alternative to HOV lane requirements for toll roads.

Various agencies, including the District, local government agencies, transportation commissions, and state agencies, have the authority to implement SCAG control measures. Enabling legislation or additional funding is required to implement some measures. Implementation can be accomplished by local ordinances, regional regulations, state laws, market incentives, and/or other techniques that are legally enforceable and fundable. These implementing techniques can also be combined.

The District supports and encourages local government implementation of the growth management strategies that reduce mobile source emissions. In the 1989 AQMP, the focus of control measure 17 was on achieving subregional jobs/housing balance ratios. At the recommendation of SCAG's Growth Management and Transportation Task Force, the focus was changed to vehicle miles traveled reduction targets for the 1991 AQMP. This change provides a means of translating the jobs/housing balance strategy to a quantitative basis that can be related to air quality benefits and allows local governments flexibility in carrying out the measure.

Growth Management is a control measure that contains both Tier I and Tier II actions. Tier I calls for local governments to identify and then implement strategies to reduce trips and vehicle miles travelled (refer to Control Measure 17, Appendix IV-E). Local governments are encouraged to carry out these Tier I commitments as expeditiously as possible.

Growth management also includes Tier II actions. Similar to other Tier II commitments in the AQMP, there are a number of technical issues relating to the implementation of growth management that need to be addressed. In particular, the strategies for reducing vehicle miles traveled need further definition. Enforceable commitments by local governments need to be developed. This is consistent with the definition of Tier II which includes, "developing strong enforceable public and private commitments for the required implementation actions, including additional funding or legislative authority as needed." Through Tier II, twenty-five million vehicle miles traveled are targeted to be reduced through growth management which will result in 44.5 tons a day reduction in ROG. Full implementation of Tier II measures is scheduled for completion by 2010.

In order to facilitate adoption of the Tier II control measure and achievement of the associated emission reduction goals, a Tier I commitment was added to create an Advisory Working Group co-staffed by SCAG, the District, and ARB, and with representation from local governments, county

transportation commissions, environmental organizations, and industry. The Advisory Working Group will identify quantifiable control strategies and an enforceable mechanism to accomplish the targeted emission reductions, recommend enforceable local implementation commitments, and identify potential legislation. The Advisory Working Group's recommendations will be presented to the SCAG Executive Committee and District Governing Board in time for the next update of the AQMP. At that time, the Growth Management Measure will be considered for Tier I emission reductions credits.

The Advisory Working Group will consider pricing strategies and land use practices that have been suggested during the public review process on the 1991 AQMP as potential control strategies for accomplishing the emission reductions attributed to the Growth Management Control Measure. Pricing strategies, such as those recommended by the California Council for Environmental and Economic Balance (CCEEB) will be evaluated as potential control strategies for reducing vehicle miles traveled (VMT). CCEEB has recommended investigating pricing strategies such as VMT fees, parking mitigation fees, and congestion pricing.

Growth management policies, such as those recommended by the Coalition for Clean Air, Sierra Club, and the National Resource Defense Council (NRDC) will also be evaluated as potential control strategies. The environmental community has recommended that local governments provide a variety of land use strategies to reduce VMT such as compact development, transit-oriented mixed-use development, urban development boundaries, developer incentives, pedestrian facilities, basing auto registration fees on smog produced, and regionwide congestion pricing.

The Advisory Working Group will also consider recommendations made by SCAG's General Development Conformity Working Group on the Growth Management Control Measure. Specifically, the recommendations were to continue to work with implementing agencies to make the growth management measure legally enforceable, make recommendations to SCAG and the District regarding technical assistance and funding, to develop a guidance document that would contain a menu of implementation options for local governments and minimum implementation criteria for transportation control measures, and assess the concept of a consolidated vehicle trip/vehicle miles travelled reduction strategy for transportation control measures.

Indirect Source Control Strategies

Indirect sources are not defined in the CCAA; however ARB's guidance document entitled, "Guidance for the Development of Indirect Source Control Programs," considers an indirect source to be "any facility, building, structure or installation, or combination thereof, which generates or attracts mobile source activity that results in emissions of any pollutant for which there is a state ambient air quality standard." Regional shopping centers, airports, or new towns are examples of indirect sources. Indirect source control measures are essential to the AQMP in that they reduce mobile source emissions. This reduction is necessary for the Basin to achieve the state and federal air quality standards as expeditiously as possible.

Indirect source control measures are not new to the AQMP. Several SCAG generated Land Use and Transportation measures contained in the 1989 AQMP (See Appendix IV-G) recommend the adoption of indirect source regulations if local governments are unable to attain specific standards within a specified timeframe. For example, SCAG included indirect source control measures in Measures 1. - Trip Reduction, 2. - Mode Shift Strategies, 3. - Goods Movement, 6. - Aircraft and Ground Service Vehicles, 8. - Airport Ground Access, and 17. - Growth Management.

For the 1991 AQMP, the District proposes to include some indirect source control measures in accordance with Section 40920 (a) (1) of the CCAA which requires the District to include provisions in the AQMP to develop indirect source control programs. Section 40716 (a) (1) specifies that the District has authority to adopt and implement regulations to reduce or mitigate emissions from indirect sources of air pollution, as well as regulations that encourage or require the use of ridesharing, vanpooling, or other efforts to reduce the number or length of vehicle trips.

The District began developing a comprehensive indirect source control program in February 1990, with a survey of approximately 2,700 interested organizations (e.g., environmental organizations, developers, etc.) and local governments to obtain ideas for reducing emissions from indirect sources. The District also held a workshop in March 1990 to again obtain ideas for indirect source programs. A status report was presented to the District Governing Board in April 1990. Based on the ideas received, the District identified several potential indirect source control measures that were considered by the District Governing Board in August 1990.

At that meeting, the Board approved the concept of initiating rulemaking activities on three of the indirect source control measures (truck program, trip reduction for schools, and sensitive receptors), which are identified in the AQMP as early action measures. Two additional control measures (environmental review program and registration program) are currently under consideration by the District's Planning Committee.

In addition, there are eight more Tier I indirect source control measures included in the 1991 AQMP for District adoption. The approach for several of the controls measures (*Special Activity Center Trip Reduction, Truck Program, Trip Reduction for Schools, Regulation XV Enhancements, and Supplemental Development Standards*) is that the District would adopt a regional rule with a future effective compliance date that could range from two to five years. During that time, local governments would have the opportunity to implement the rule at the local level through a certification process. Through the certification process, the District would delegate implementation of the program to a local government in accordance with Section 40717 (e) (1 - 3) of the CCAA.

Relative to environmental programs, a measure is included (*Environmental Review Program*) to be implemented through a partnership between local governments and the District. Under this program, the District's comments would remain advisory to the lead agency and local governments would retain their land-use decision-making authority.

The control strategy for the *sensitive receptor* certification control measure calls for the District to establish standards for the performance of a public health risk assessment and for siting criteria for sensitive receptors. It

is anticipated that local governments will take the lead by incorporating the siting criteria into their zoning ordinances and General Plans.

The control strategy for the *Registration Program* calls for the District to adopt a rule to implement this program. This program is necessary to develop emissions inventories for indirect sources and monitor quantitatively implementation.

The District will work with SCAG, local governments, transportation commissions, special districts, and other affected groups in the Basin to refine the various indirect source control measures that are being considered for inclusion in the 1991 AQMP. As with the SCAG control measures, emission reductions consider the cleaner-fueled vehicle fleet that will result from ARB's control measures.

Off-Road Motor Vehicle Control Strategies

Off-road motor vehicles include construction and farm equipment, locomotives, marine vessels, off-road motorcycles, off-highway vehicles, utility engines, and aircraft. Strategies to reduce off-road vehicle emissions can be characterized in terms of operational modifications, application of emission control technology, and limitations on usage. The 1991 AQMP includes 22 off-road motor vehicle control measures. Nine of these control measures are new for this AQMP revision.

The following local and state government agencies have authority to develop and/or adopt control measures to reduce off-road motor vehicle emissions in the Basin:

California Air Resources Board (ARB)

The ARB has significant authority over off-road motor vehicles. Off-road motor vehicles that ARB can regulate include utility engines, construction and farm equipment (above 175 horsepower), off-road motorcycles, marine vessels, off-highway vehicles (e.g., forklifts), and locomotives. ARB plans to adopt emission standards and test procedures for these types of off-road vehicles. An exception is regulatory authority over locomotives--ARB can only require operational and retrofit modifications to in-use locomotives.

Southern California Association of Governments (SCAG)

SCAG has authority over transportation planning in the Basin. Some off-road motor vehicles, such as commuter trains, are considered within the scope of this transportation planning effort. Various local, state, and federal government agencies, as well as private organizations have implementing authority over proposed SCAG off-road vehicle control measures. SCAG off-road control measures focus toward decreasing the emissions impacts from airport operators and locomotives.

South Coast Air Quality Management District (District)

The District has authority in select areas regarding the control of off-road motor vehicle emissions. These areas, for the most part, cover marine vessel operation. The District has also developed an off-road control measure for aircraft, and construction and farm equipment (less than 175 horsepower), which would be implemented by various federal government agencies.

Federal Government

Various federal government agencies have authority over aircraft exhaust emission control, and certain aspects of marine vessel emission control. In addition, the 1990 Federal Clean Act specifically directed authority over locomotive emission control (emission standards for new engines), and construction and farm equipment (less than 175 horsepower) to the federal government, as mentioned above.

Control methodologies and emission reductions for off-road motor vehicle control measures are shown in Table 4-9 and Figure 4-5.

TABLE 4-9

Emission Reduction Strategies to Reduce Off-Road Mobile Source Emissions

TIER	SOURCE CATEGORY	CONTROL METHODOLOGY	EMISSION REDUCTIONS					Number of Measures	Range of Cost-Effectiveness (\$/Ton)
			ROG	NOx	CO	SOx	PM10		
I*	Utility Engines Construction and Farm Equipment Marine Vessels Off-Road Motorcycles Locomotives Off-Highway Vehicles Aircraft	More Stringent Standards Operational Modifications Low In-Use Emissions Alternative Fuels	34	120	140	38	6	6	N/A
			(ARB Control Measures)						
			14	20	30	23	0	8	\$3,800 to \$25,300
			(District Control Measures)						
			5	29	19	2	1	4	N/A
			(SCAG Control Measures)						
II	Pleasure Boats	More Stringent Standards	6	—	25	—	—	1	N/A
		Alternative Fuels	(District Control Measure)						
III	Pleasure Boats	More Stringent Standards	14	48	49	—	1	4	N/A
			(District Control Measures)						
	Locomotives	Advanced Emission Control Equipment							
	Non-Farm Equipment	Alternative Fuels							

* Gross emission reductions excluding overlap amongst control measures.

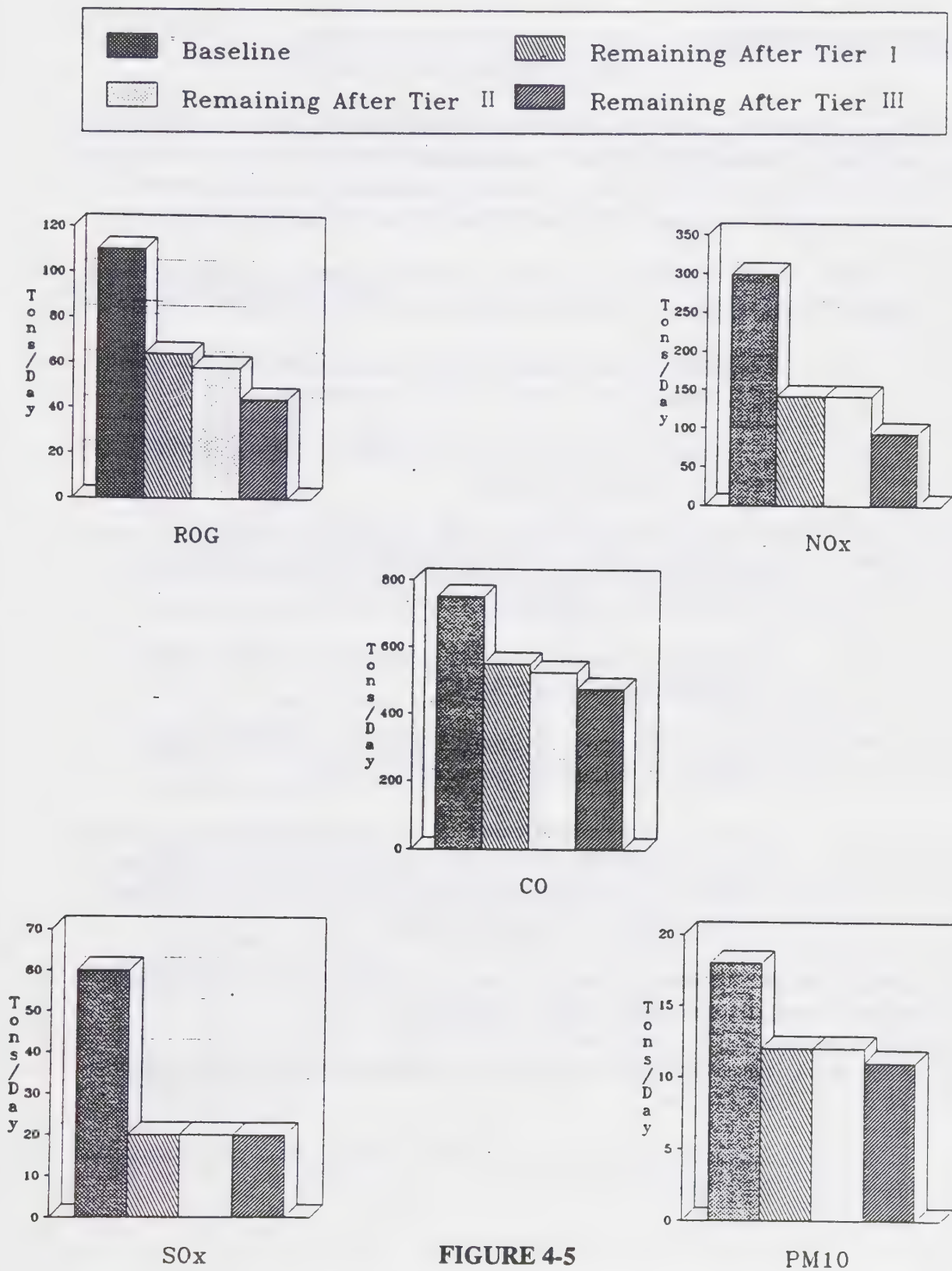


FIGURE 4-5
Mobile Off-Road Emission Profiles

MARKET INCENTIVES

The air pollution challenge in Southern California needs to be supported with every possible type of emission-reduction tool. The success of source specific regulations is proven. Market incentives can complement the existing regulatory system. The goal is clean air, at the lowest possible cost.

The 1991 AQMP integrates a number of market incentive measures. The major concepts which are under development are briefly described below.

- o Evaluate the use of the District's existing Emission Fee System to increase incentives for emission reductions.
- o Investigate the concept of emission reduction credits and offsets for Indirect Sources.
- o Evaluate the use of toll roads, and other mechanisms such as congestion fees to increase vehicle occupancy rates and to divert trips to other modes of travel.
- o Consider emission fees for higher pollution engines to encourage clean fleet turnover.
- o Address the need to develop effective market incentives to improve the balance of growth in the region.
- o Evaluate the establishment of a marketable permit program that allows facilities the ability to trade emissions reduction in and among participating facilities in order to meet prescribed annual emission reduction targets.

In addition, the following legislative proposals are also under consideration to further enhance the use of market incentives.

- o Consider the use of tax credits to lower the cost of air pollution equipment.
- o Expand funding for the District's small business loan assistance program.

- o Revise vehicle registration fees to increase the cost of driving older, higher-polluting vehicles.
- o Pursue consumer labeling and surcharge pricing programs for high-VOC products. Direct use of funds to public education programs.

ECONOMIC IMPACTS

Cost-Effectiveness

This section addresses the cost-effectiveness of the District's control measures. Cost-effectiveness in terms of 1987 dollars was estimated for 49 (out of 93) District Tier I control measures. The measures were ranked from the most cost-effective to the least cost-effective, as shown in Table 6-3.

Cost-effectiveness was calculated based on the Discounted Cash Flow Method, a real interest rate of 4 percent, and a 10-year economic life of control equipment. In cases where information regarding the economic life of equipment was available, this information was substituted for the standard 10-year period.

Cost-effectiveness for control measures with more than one pollutant involved was developed by adding emission reductions from all pollutants, except for CO, which was divided by seven (Cost-Effectiveness: District Options for Satisfying the Requirements of the CCAA, ARB, 1990). This composite cost-effectiveness value is used to rank the control measures. Cost-effectiveness ranges from a savings of \$6,800 (Aerodynamic Devices for Trucks) to a cost of \$62,000 (Afterburners) per ton of pollutant reduced. The distribution of control measures within this range is shown in the following table.

<u>Cost-Effectiveness</u>	<u>No. of Control Measures</u>
Savings	4
Under \$1,000	10
\$1,000 - \$5,000	16
\$5,001 - \$10,000	6
\$10,001 - \$25,000	8
Above \$25,000	<u>5</u>
	49

The cost-effectiveness evaluation of SCAG's control measures is presented in Appendix IV-E. The procedures developed by SCAG to do the cost-effectiveness evaluations were a combination of the Discounted Cash Flow (DCF) and Levelized Cash Flow (LCF) methods. The range of control costs presented in Appendix IV-E was 1987 discounted costs assuming full implementation of each measure in 2010 (i.e., 2010 annualized capital and Operating and Maintenance costs discounted back to 1987 using a six percent discount rate). Cost-effectiveness is derived by dividing the annualized discounted costs by single-year ROG emission reduction benefits.

The cost-effectiveness of several other measures is not included because of a lack of data at this time.

Socio-Economic Impacts

The socio-economic analysis of the draft 1991 AQMP was performed in two parts. The first part consisted of the quantified Tier I measures and known quantified benefits categories. The second part consisted of the projection of these impacts relative to the unquantified remaining Tier I, Tier II, and Tier III controls.

Table 4-10 shows the estimated costs, benefits, and job impacts of each component. On average, Part 1 analysis has an annual cost of \$1.318 billion for 56 control measures and an annual benefit of \$6.201 billion for implementing the AQMP. There will be 22,478 jobs created from quantified measures and benefits. In 2010, both costs and benefits will reach the maximum for an amount of \$1.563 and \$11.777 billion, respectively. An additional 99,623 jobs will be created for that year.

The projected costs of unquantified measures could reach \$3.528 billion in 2010. Additional research is needed to quantify those known but immeasurable benefits. The projected job impact of Part 2 analysis is a reduction of 80,300 jobs from the baseline job growth (without the AQMP) in 2010.

The total costs and benefits of this two-part analysis for the year 2010 are \$5.091 and \$11.777 billion, respectively. An additional 19,323 net jobs could be created in 2010, as a result. Using the projected costs and jobs of Part 2 for 2010, the annual costs and benefits of this two-part analysis from 1991 to 2010, on average, are \$4,846 billion and \$6,201 billion, respectively. The resulting net job impact is a reduction of 57,822 jobs. Both the average annual costs and job impacts are overstated because projected costs for the years prior to 2010, when emission reductions reach the maximum, should be less than those for 2010.

In addition, the 24 transportation and land use measures proposed by SCAG will cost \$3.711 billion to implement. These measures relieve congestion which amounts to an annual benefit \$1.251 billion, at least. An additional 81,527 jobs will be created annually, on average, as a result of these measures and congestion relief benefits.

TABLE 4-10
Impacts of the 1991 AQMP

	AVERAGE ANNUAL*			YEAR 2010		
	COSTS (millions of 87 dollars)	BENEFITS (millions of 87 dollars)	JOBS	COSTS (millions of 87 dollars)	BENEFITS (millions of 87 dollars)	JOBS
QUANTIFIABLE (Part 1)						
Control Measures						
District (1992-2010)	1188		-27039	1479		-45381
ARB (1995-2010)	155		-8474	84		-17517
Subtotal [costs (1992-2010)]	1318		-34113	1563		-62783
Benefits (1991-2010)						
Visibility		1520	21327		2370	53014
Morbidity		1622	-10688		3273	-14616
Mortality		2884	38844		5818	109794
Agriculture		36	731		80	1357
Materials		139	3838		236	9503
Subtotal (benefits)		6201	54956		11777	162926
SUBTOTAL [COSTS & BENEFITS (1991-2010)]			22478			99623
UNQUANTIFIABLE (Part 2)						
Control Measures						
Tier I	1210	-	-27500	1210	-	-27500
Tier II	1365	-	-31100	1365	-	-31100
Tier III	953	-	-21700	953	-	-21700
Subtotal	3528		-80300	3528		-80300
GRAND TOTAL	4846		-57822	5091		19323

*Average annual estimates were calculated with respect to the pertinent periods. Therefore, these estimates are additive if different analysis periods prevail. Moreover, average annual estimates of job impacts are not additive due to nonlinearity of the REMI model.

V FUTURE AIR QUALITY





Clockwise from upper left: methanol-powered Taurus; electric-powered Impact; Solar Flair; Rich Davis, SCRTD's maintenance and equipment chief, with one of his clean fuel buses

Rolling Toward an "Alternative" Era

Development of new "ultra-clean" vehicles is keeping pace with development of alternative fuels. Ford has introduced a methanol-powered Taurus. General Motors has designed the electric-powered Impact sports car as a means for ushering in the "zero-emission" era in California transportation. Students at Cal Poly University in Pomona have successfully road-tested the Solar Flair, powered solely by sunlight. And several Southern California Rapid Transit District (SCRTD) buses are keeping schedules via natural gas.

CHAPTER 5

FUTURE AIR QUALITY

Introduction

Air Quality Projection Summary

Modeling Approach and Analysis

INTRODUCTION

Air quality modeling is an integral part of the planning process to achieve clean air. The control strategy in the 1989 AQMP was developed from a three-step modeling process. The three-step process began with an analysis of future NO₂ air quality, followed by PM₁₀ air quality, and lastly, future ozone air quality. Air quality analyses under the 1991 AQMP were performed in keeping with this three-step modeling approach. A linear rollback approach was used to project future carbon monoxide (CO) air quality.

Visibility impairment analyses have also been performed even though the CCAA does not specifically require that visibility be addressed for the 1991 AQMP. In addition, as part of the District's efforts to examine interbasin transport, predictions of future ozone air quality for the Coachella Valley are evaluated.

Detailed information on the modeling approach, data gathering, model development and enhancement, model application, and interpretation of results is presented in nine technical reports (Technical Reports V-A to V-I). The following sections summarize the results of the modeling efforts.

AIR QUALITY PROJECTION SUMMARY

Figure 5-1 shows the model-predicted regional peak concentrations for the four nonattainment criteria pollutants, as percentages of the most stringent federal standard, for the years 1987, 2000, and 2010 (with and without further emission controls). Figure 5-2 shows similar information related to the most stringent California state standards. The following sections summarize the future air quality and attainment year for the four criteria pollutants and visibility.

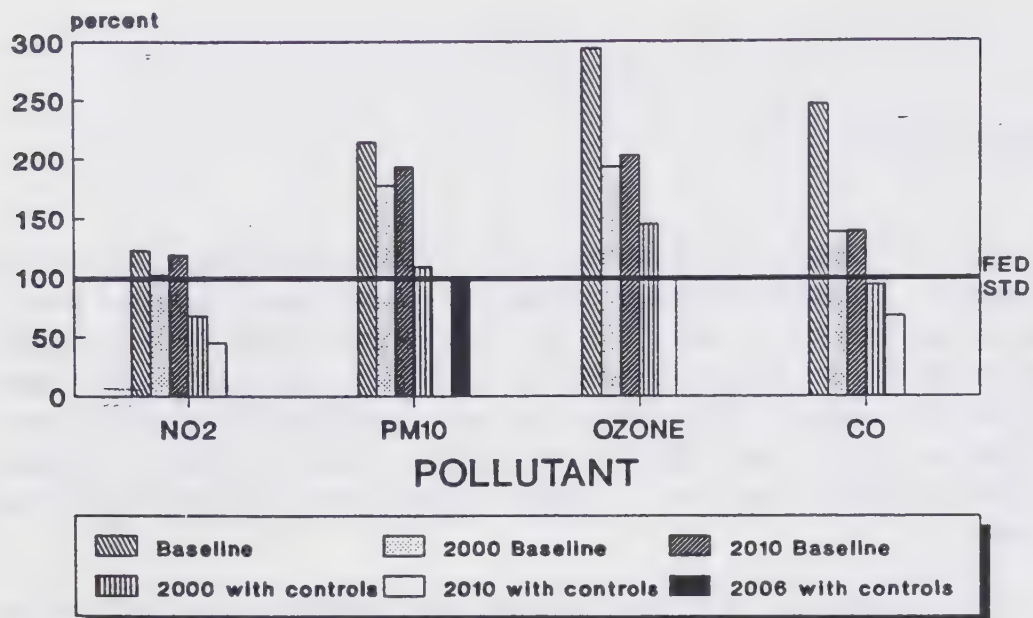


FIGURE 5-1

Projection of Future Air Quality in the Basin In Comparison with the Most Stringent Federal Standards

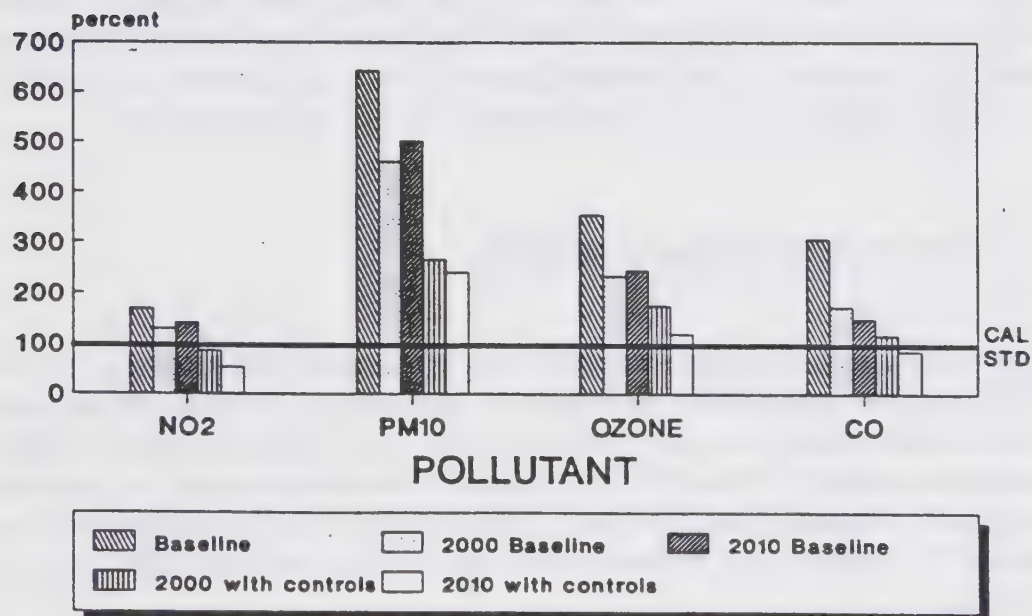


FIGURE 5-2

Projection of Future Air Quality in the Basin in Comparison with the Most Stringent California State Standards

Nitrogen Dioxide - Attain Federal and State Standards by 2000

The NO₂ trend analysis indicates that the Basin will comply with both standards by the year 2000 with the implementation of proposed control measures. The trend analysis was performed using the highest NO₂ concentrations observed in a three-year period. ARB's recommended guidelines on design day calculation allow the elimination of extreme concentrations; and the ARB and the District will further review the data to determine if the design values should be adjusted based on this consideration. If lower NO₂ concentrations are used in the trend analysis, the Basin will be in compliance before 2000.

PM10 - Attain Federal Standards by 2006; Nonattainment of State Standards by 2010

The PM10 modeling results indicate that the Basin will be in compliance with the federal 24-hour PM10 standard by the year 2000, and the federal annual average PM10 standard by the year 2006 as required by the new federal Clean Air Act. With respect to the state PM10 standards, the Basin will not meet either the 24-hour or the annual average standard by 2010, even with the implementation of all proposed control measures.

Ozone - Attain Federal Standard by 2010; Nonattainment of State Standard by 2010

Ozone modeling results for the year 2010 indicate that the Basin will be in compliance with the federal ozone standard but not the state standard. The number of Stage I episodes (ozone concentration levels greater than 20 pphm) is expected to be significantly reduced by the year 1997 and virtually eliminated by 2000.

Carbon Monoxide - Attain Federal Standards by 2000; State Standards by 2005

Modeling results indicate that with all proposed control measures for 2000, the entire Basin will be in compliance with the federal 1-hour and 8-hour

carbon monoxide (CO) standards and the state 1-hour standard, but not the state 8-hour standard. The state 8-hour CO standard will be met by 2005. ARB's recommended guidelines on design day calculation allow the elimination of extreme concentrations; and the ARB and the District will further review the data to determine if the design values should be adjusted based on this consideration. If lower CO concentrations are used in the analysis, the Basin will be in compliance with all standards by 2000.

Visibility - Nonattainment of State Standard by 2010

Analyses using improved future-year air quality projections with controls in place for the year 2010, indicate that annual average visibility will improve to about 26 miles in the coastal areas and between 14 to 16 miles in the inland areas.

Conclusion

Table 5-1 summarizes the expected year for attainment of the various federal and state standards for the four pollutants analyzed. As shown, the Basin will be in compliance with federal and state standards for all pollutants except the state ozone and PM10 standards by the year 2010.

MODELING APPROACH AND ANALYSIS

Nitrogen Dioxide

A linear rollback approach was used to evaluate future nitrogen dioxide concentrations (see Technical Report V-I for details). Projections were made for several key locations in the Basin representative of areas with persistent NO₂ violations. Future-year annual average NO₂ concentrations were determined from projected total oxides of nitrogen (NO_x) concentrations (based on the linear rollback approach) using NO₂/NO_x ratios extrapolated from ten years of historical annual averaged measurements at each of the locations. Figure 5-3 presents the predicted

TABLE 5-1
Expected Year for Attainment of the State and Federal
Standards for the Four Criteria Pollutants

Pollutant	Standard	Concentration Level	Control Requirement (Tier)	Expected Compliance Year
Ozone	Federal 1-hour	12 pphm	I, II, III	2010
	State 1-hour	10 pphm	I, II, III	beyond 2010
PM ₁₀	Federal Annual	50 $\mu\text{g}/\text{m}^3$	I, II	2006
	Federal 24-hour	150 $\mu\text{g}/\text{m}^3$	I, II	2000
	State Annual	30 $\mu\text{g}/\text{m}^3$	I, II, III	beyond 2010
	State 24-hour	50 $\mu\text{g}/\text{m}^3$	I, II, III	beyond 2010
CO	Federal 8-hour	9.5 ppm	I	2000
	Federal 1-hour	35 ppm	--	1990
	State 8-hour	9 ppm	I, II, III	2005*
	State 1-hour	20 ppm	I	2000
NO ₂	Federal Annual	5 pphm	I	2000
	State 1-hour	25 pphm	I	2000*

* The compliance year is calculated based on the highest concentrations observed during a three-year period. ARB's recommended guidelines on design day calculation allow the elimination of extreme concentrations; and the ARB and the District will further review the data to determine if the design values should be adjusted based on this consideration. If lower concentrations are used in the analysis, the Basin will be in compliance of all CO and NO₂ standards before 2000.

annual average NO₂ concentrations for 1987, and 2000 and 2010 with and without controls. Maximum 1-hour NO₂ concentrations were projected from the baseline maximum 1-hour concentrations using linear rollback. The predicted maximum 1-hour NO₂ concentrations for the baseline conditions with proposed control measures are shown in Figure 5-4.

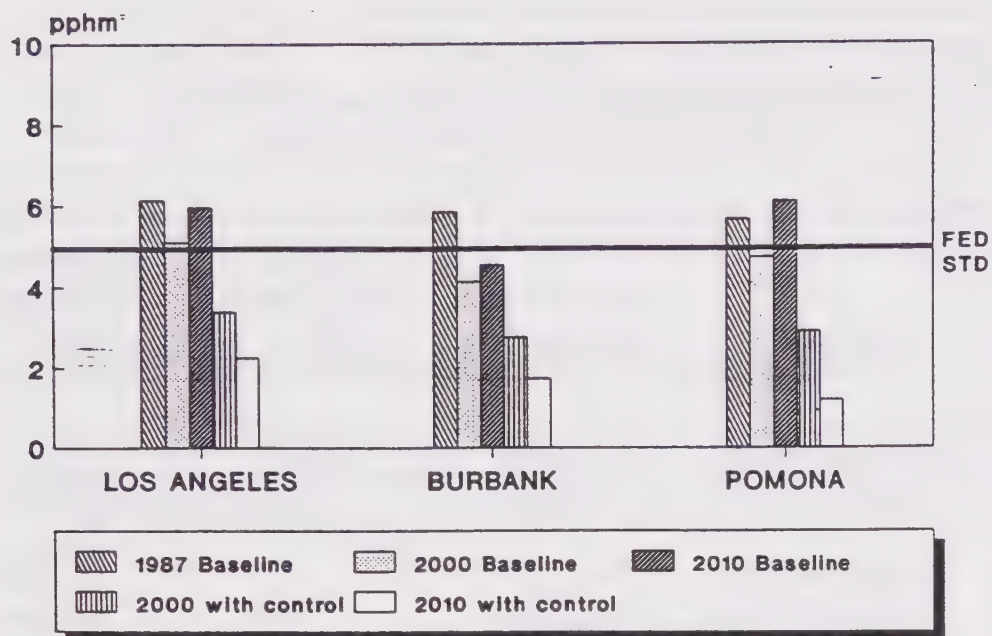


FIGURE 5-3
Annual Average NO₂ Concentration Projections

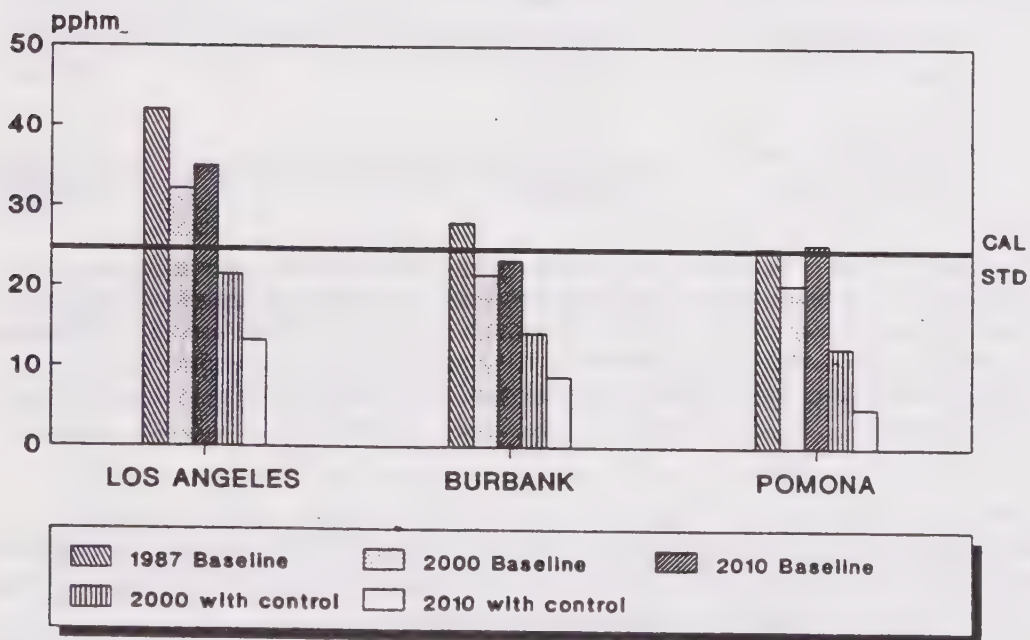


FIGURE 5-4
Maximum 1-Hour NO₂ Concentration Projections

The results indicate that the federal annual NO₂ standard will be met throughout the Basin by the year 2000 without additional emission controls; however, annual average NO₂ concentrations at Pomona will violate the federal standard in the year 2010 due to projected localized emissions growth. Therefore, implementation of the proposed control measures would be needed to bring the entire Basin into compliance with the federal annual standard.

Based on projected future-year maximum 1-hour NO₂ concentrations assuming no further controls, the Basin will not be in compliance with the state 1-hour standard. However, implementation of the proposed controls by the year 2000 would bring the entire Basin into compliance with the state 1-hour standard, and compliance will be maintained through the year 2010. The trend analysis was performed using the highest NO₂ concentrations observed in a three-year period. ARB's recommended guidelines on design day calculation allow the elimination of extreme concentrations; and the ARB and the District will further review the data to determine if the design values should be adjusted based on this consideration. If lower NO₂ concentrations are used in the trend analysis, the Basin will be in compliance before 2000.

PM10

Within the Basin, PM10 particles are either directly emitted into the atmosphere (e.g., primary particles), or are formed through atmospheric chemical reactions from precursor gases (e.g., secondary particles). Primary PM10 includes road dust, diesel soot, combustion products, and other sources of fine particles. Secondary products, such as sulfates, nitrates, and complex carbon compounds are formed from reactions with oxides of sulfur, oxides of nitrogen, and reactive organic gases (ROG).

Because of the dual nature of PM10, both receptor and dispersion models were used to estimate the source contributions to ambient PM10 levels as measured at different monitoring sites. Details of the PM10 modeling are presented in Technical Reports V-D and V-F.

Receptor models require specific knowledge about the chemical components of the ambient PM10 samples and emissions of all sources emitting primary PM10. Special studies were conducted to develop a data base and a comprehensive library of chemical profiles for specific sources of PM10

emissions. Using a Chemical Mass Balance (CMB) receptor model, which statistically determines the best chemical match between sources and receptors, ambient PM₁₀ concentrations at each site can be apportioned according to the contributing sources.

For secondary sulfates and nitrates, a particle-in-cell (PIC) Lagrangian dispersion model was used. Details of this model are described in Technical Report V-D. Using emissions data from various sources of oxides of sulfur and oxides of nitrogen, the PIC model calculated the resulting concentrations and the source contributions of sulfates and nitrates at each site. Linear apportionment was then used to calculate the organic PM₁₀ components from ROG emissions.

These models were used in combination with emissions projections to determine future PM₁₀ air quality for a given future-year baseline or control scenario. Figures 5-5 and 5-6 depict the CMB modeling source apportionment results for the annual average and maximum 24-hour average PM₁₀ concentrations in 1986 at five monitoring stations. Four of these stations have concurrent data for both the routine PM₁₀ and the chemically-speciated PM₁₀ sampling. For the Ontario PM₁₀ site, chemically speciated data were taken from nearby Upland. As shown in Figures 5-5 and 5-6, Rubidoux has the highest annual and 24-hour average concentrations. Dust, either windblown or from paved/unpaved roads, is the largest single source of PM₁₀ at Rubidoux on an annual basis, with nitrates as the second largest component. On a 24-hour basis, nitrates are by far the largest component, accounting for over 50 percent of the total PM₁₀. The dominance of nitrates on a 24-hour basis is evident at each of the five sites and is evident during most of the days with high PM₁₀ measurements since the inception of the PM₁₀ monitoring program in 1985.

Figures 5-7 and 5-8 depict future annual average PM₁₀ air quality projections at these five sites compared to federal and state annual PM₁₀ standards, respectively. Although each standard is based on an annual average, separate calculations are required because the federal standard is based on an arithmetic average, whereas the state standard is based on a geometric average. In general, geometric averages will be slightly lower than arithmetic averages. Shown in each figure are the estimated baseline conditions for the years 1986, 2000, and 2010, along with projections for 2000 and 2010 with control measures in place. All areas will attain the federal

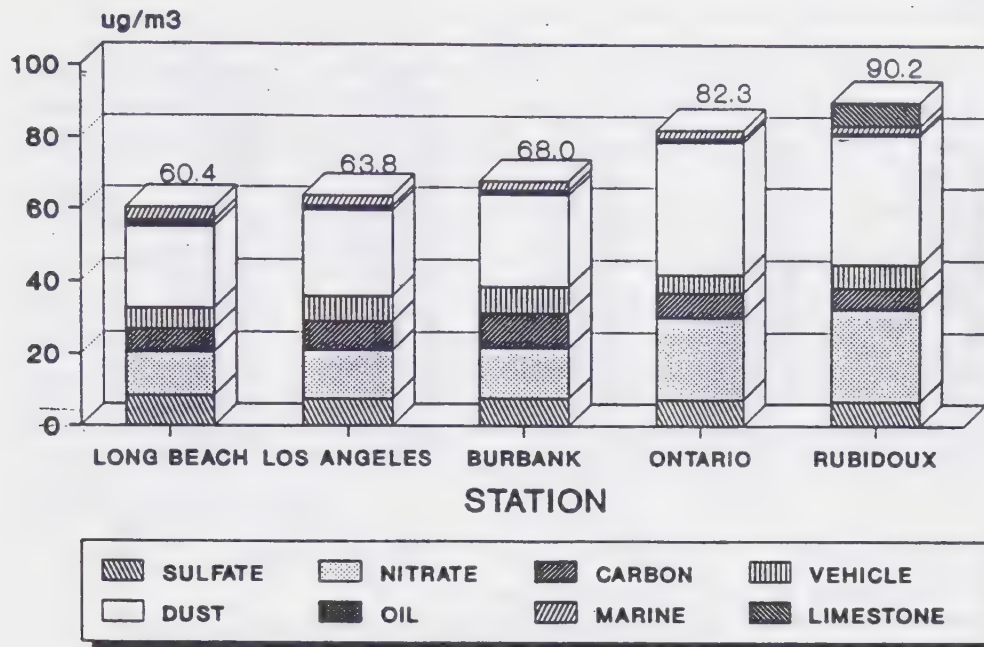


FIGURE 5-5

Source Apportionment of 1986 Annual Average PM₁₀ Concentrations in the South Coast Air Basin

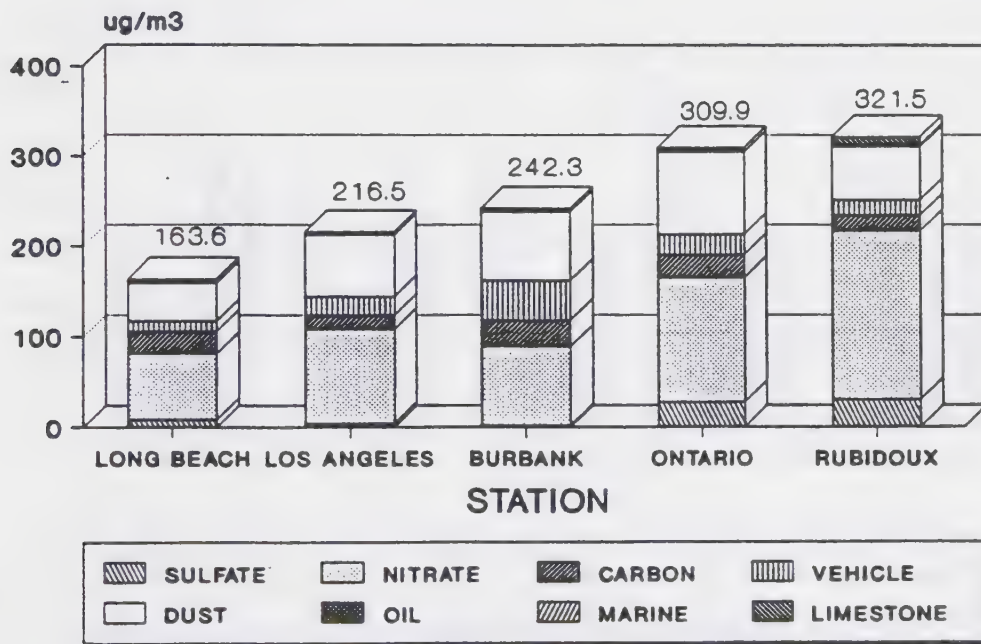


FIGURE 5-6

Source Apportionment of 1986 Maximum 24-Hour PM₁₀ Concentrations in the South Coast Air Basin

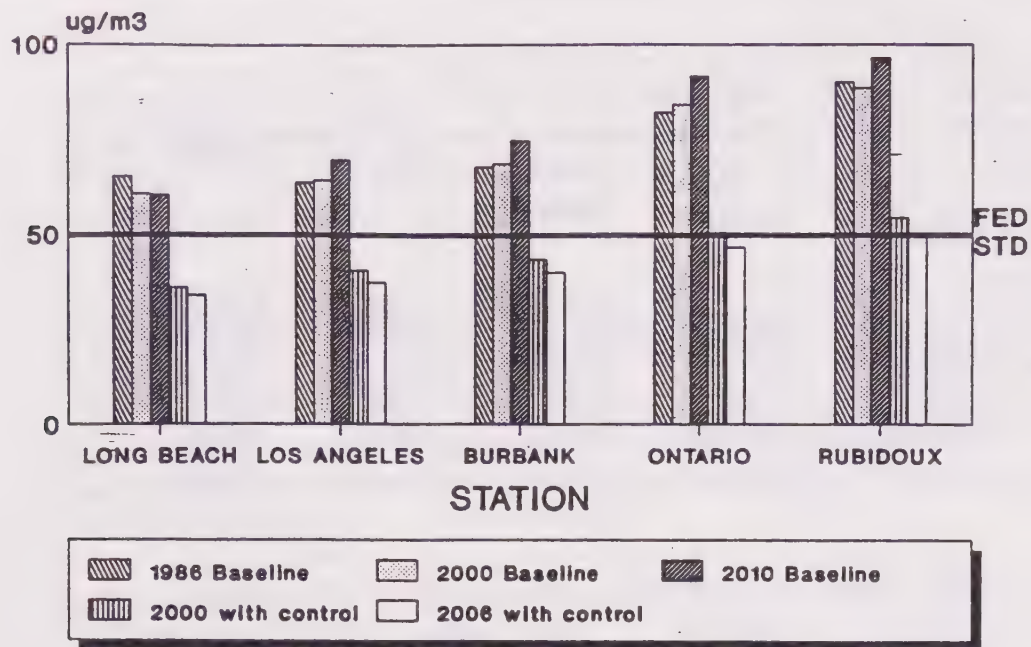


FIGURE 5-7

Annual Arithmetic Average PM10 Air Quality Projection in the South Coast Air Basin

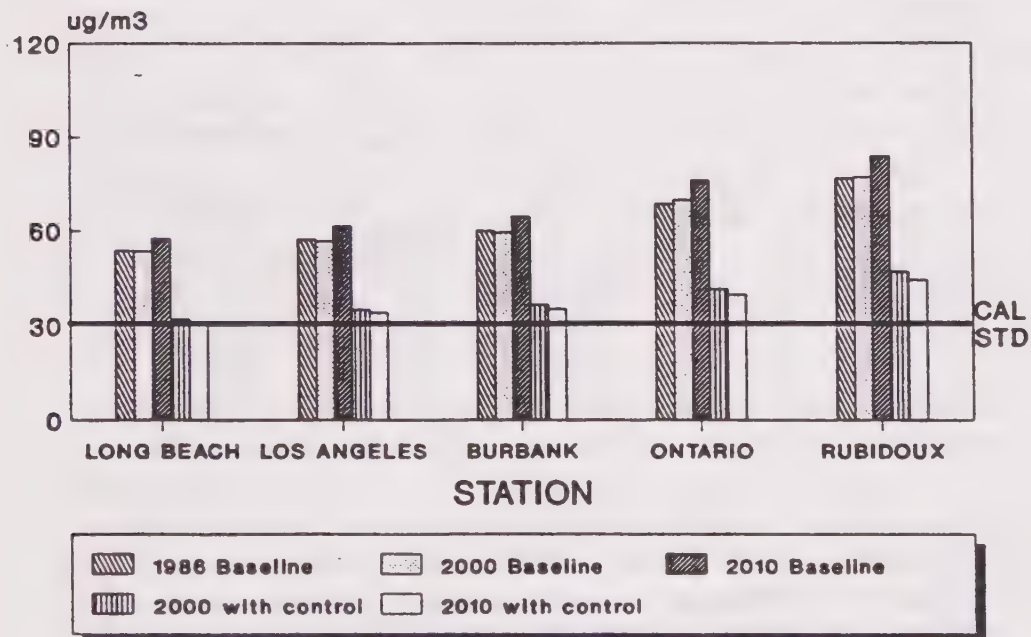


FIGURE 5-8

Annual Geometric Average PM10 Air Quality Projection in the South Coast Air Basin

annual standard by the year 2000, except Rubidoux, and it will be in compliance by 2006. Relative to the state annual standard, none of the sites will attain the standard by 2010, but the coastal area of Long Beach will be close.

The compliance projections for the 24-hour state and federal standards are shown in Figure 5-9. With respect to the federal 24-hour standard, all areas will be in attainment by the year 2000. However, the Basin will not be able to meet the state standards by the year 2010. For the state 24-hour standard, Rubidoux, Ontario, and Burbank will be about twice the standard by 2010. Only the coastal areas near Long Beach will be close to attainment with the state 24-hour standard.

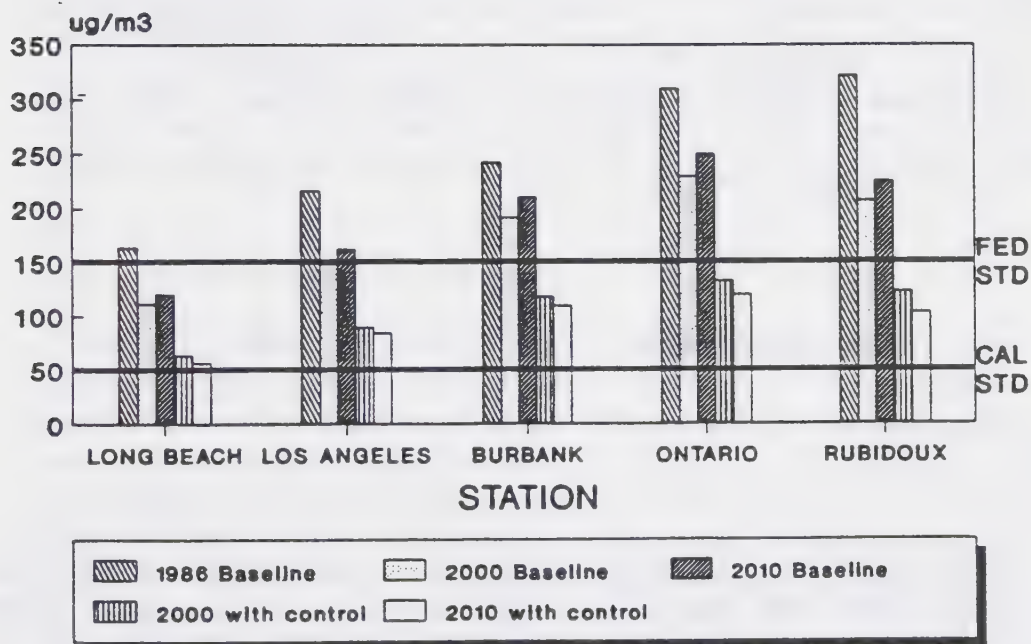


FIGURE 5-9

Maximum 24-Hour PM10 Air Quality Projections in the South Coast Air Basin

Ozone

As discussed in the 1989 AQMP, it is desirable to perform ozone air quality analyses using several different meteorological episodes; however, only one episode was modeled for the 1989 AQMP. Since then, measurement data from the 1987 Southern California Air Quality Study (SCAQS) became available for modeling purposes. For the 1991 AQMP, three ozone meteorological episodes have been used to predict future air quality. Two new meteorological episodes (from the SCAQS) were used to complement the single episode from the 1989 AQMP. Table 5-2 shows the three meteorological episodes used for ozone air quality analysis.

TABLE 5-2
Ozone Meteorological Episodes Used in Urban Airshed Model (UAM)
Simulations of the South Coast Air Basin

Episode	Peak Concentration (pphm)
June 5-7, 1985	36
August 26-28, 1987	29
June 23-25, 1987	24

The air quality simulation model used for ozone analyses is the Urban Airshed Model with the Carbon Bond Mechanism IV chemistry (UAM-CBM4). It is the recommended model for ozone analysis by the U.S. Environmental Protection Agency (EPA) and the ARB. Performance evaluations of the three meteorological episodes are discussed in Technical Report V-B. UAM results for the various future-year baseline and control scenarios are presented in Technical Report V-C, and are summarized here.

Various improvements in inputs and modeling techniques were made for the 1991 AQMP in addition to the use of multiple episodes. These improvements include the use of more sophisticated meteorological models to generate gridded wind fields and mixing heights, inclusion of biogenic emissions, and incorporating upper air measurements of pollutant precursors to ozone formation.

Baseline Changes (No Further Controls)

Table 5-3 shows the total ROG and NO_x emissions in the Basin on the first day of the June 5-7, 1985 episode. The emissions presented in Table 5-3 are episode-specific and therefore differ slightly from the annual average daily emissions reported in Chapter 3. The modeling results indicate that without additional controls, there will be some air quality improvement relative to peak ozone concentrations from 1985 to 2000. However, peak ozone concentrations will increase from 2000 to 2010 without additional controls.

Figure 5-10 depicts the predicted basinwide maximum ozone for each future year for the three meteorological episodes modeled. As shown, basinwide peak ozone reductions are on the order of 5 to 7 pphm from either 1985 or 1987 (depending on the episode) to 1994, about 2 pphm from 1994 to 1997, and about 1 pphm from 1997 to 2000. Regional maximum ozone concentrations will increase on the order of 1 pphm from 2000 to 2010. Similar modeling results are seen for the two 1987 meteorological episodes.

Control Strategy Impacts

Figure 5-11 shows the predicted basinwide maximum ozone for the three meteorological episodes for the years 1994, 1997, 2000, and 2010 with proposed emission controls in place. The maximum ozone concentrations and emission levels are also presented in Table 5-3. The results indicate that the proposed control strategy will eliminate Stage I episodes before the year 2000 and will bring the entire Basin into compliance with the federal ozone standard by the year 2010. Regional maximum ozone concentrations in the year 2010 will be between 11 and 12 pphm for the three meteorological episodes.

TABLE 5-3
Baseline Precursor Emissions and Model-Predicted Ozone
Concentrations for the South Coast Air Basin*

Scenario	Episode-Specific Emissions (tons/day)		Peak Ozone Concentration (pphm)
	ROG	NOx	
1985 Baseline	1637	1331	33.5
1994 Baseline	1107	1063	26.0
1997 Baseline	1042	1002	23.9
2000 Baseline	1010	991	23.4
2010 Baseline	1067	1095	24.5
1994 Control	920	984	22.9
1997 Control	771	783	21.1
2000 Control	477	650	17.1
2010 Control	187	399	11.9

*Emissions are for the June 1985 episode and ozone concentrations are for the last day of the June 1985 episode.

Spatial distribution of maximum ozone concentrations for the 1985 base year, 2000 and 2010 with further controls are presented in Figures 5-12, 5-13, and 5-14, respectively. The future-year ozone results are based on the June 1985 meteorological episode. The predicted ozone concentrations will be significantly reduced in the future years in all parts of the Basin and in the Coachella Valley with the implementation of proposed control measures. As mentioned, the UAM simulations include biogenic emissions as input. Simulations without biogenic emissions show that maximum ozone concentration levels will be below the state standard with a peak regional value of 9.5 pphm (see Technical Report V-C for further discussions). Similar results occur for both 1987 meteorological episodes.

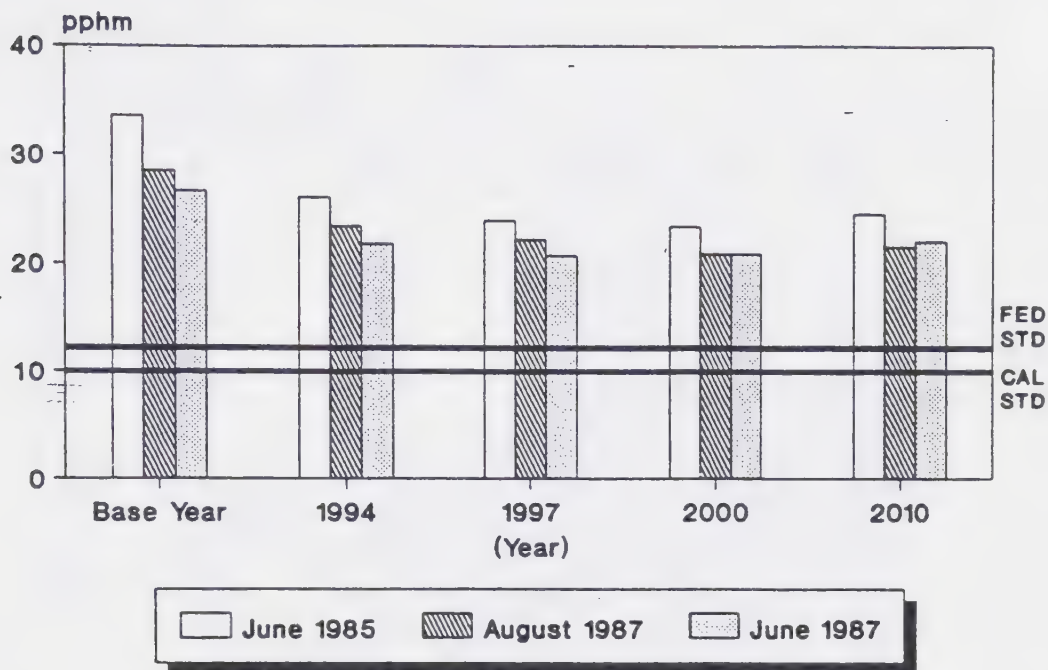


FIGURE 5-10

Basinwide Maximum Ozone Concentrations Assuming No Further Controls

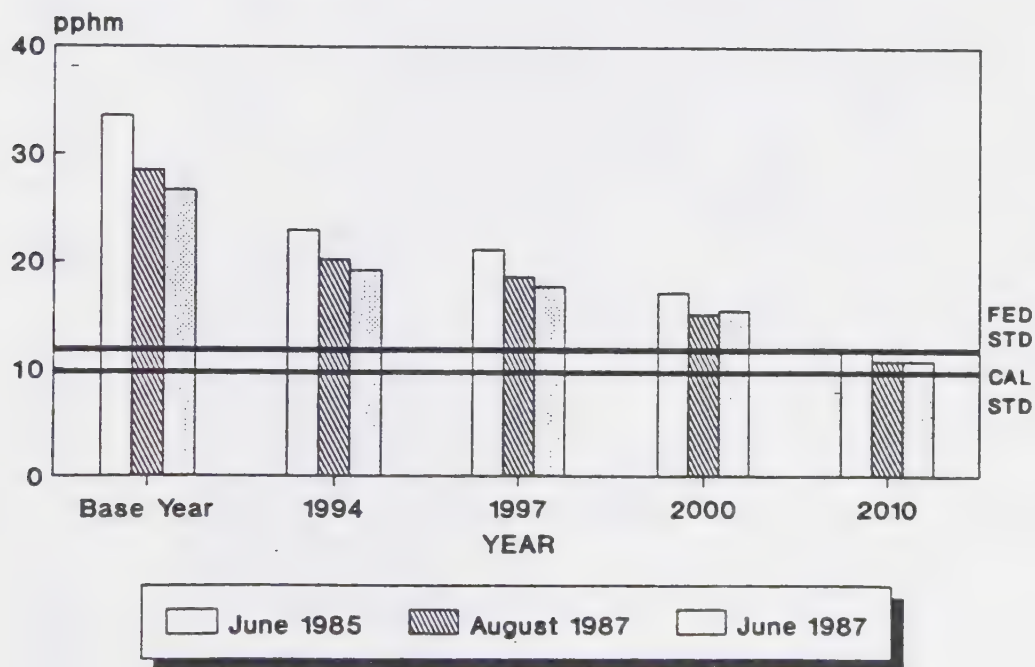


FIGURE 5-11

Basinwide Maximum Ozone Concentrations with Proposed Emission Controls

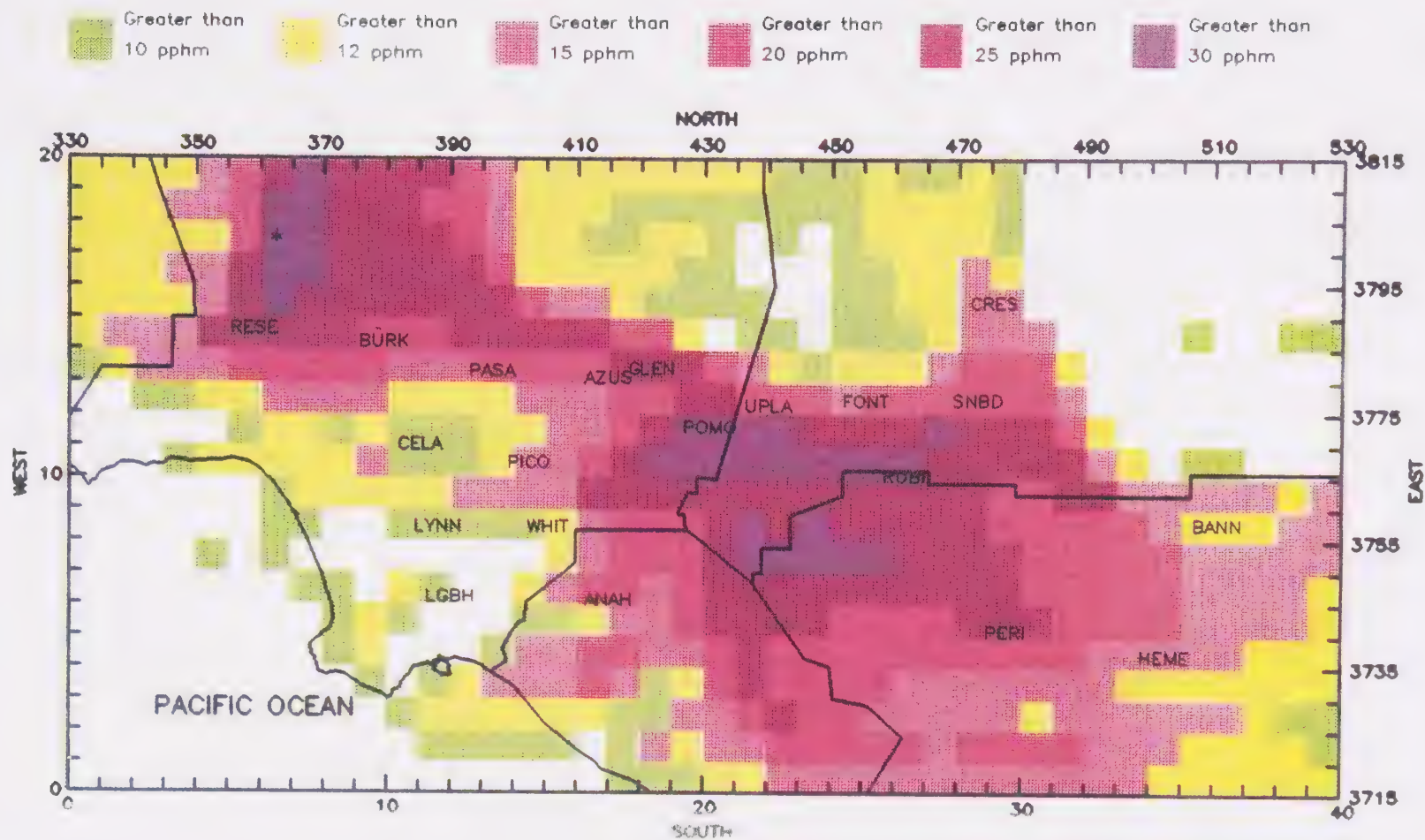


FIGURE 5-12

Model-Predicted Maximum Hourly Ozone Concentrations in the South Coast Air Basin in 1985

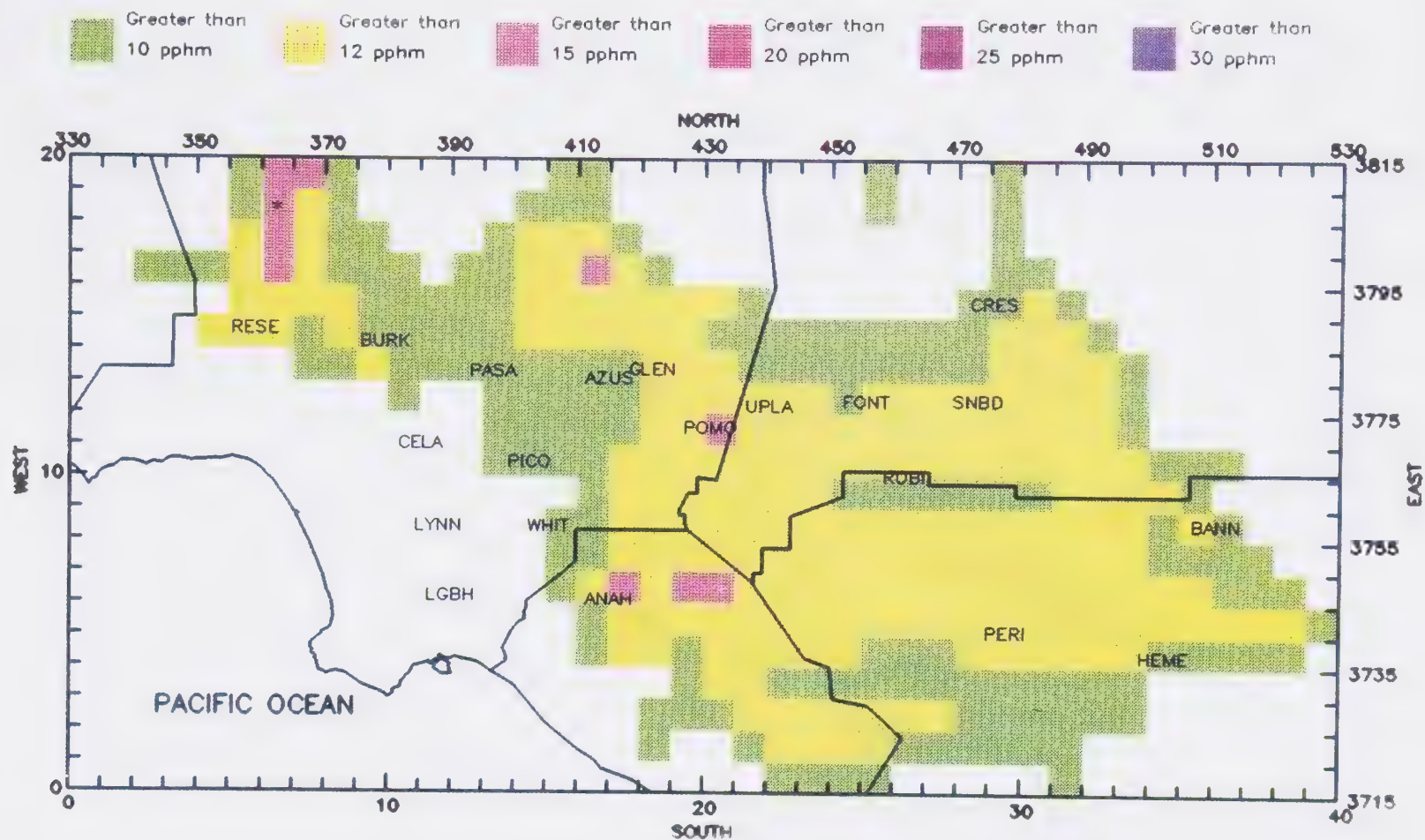


FIGURE 5-13

Model-Predicted Maximum Hourly Ozone Concentrations in the South Coast Air Basin in 2000 with Implementation of Proposed Emission Controls

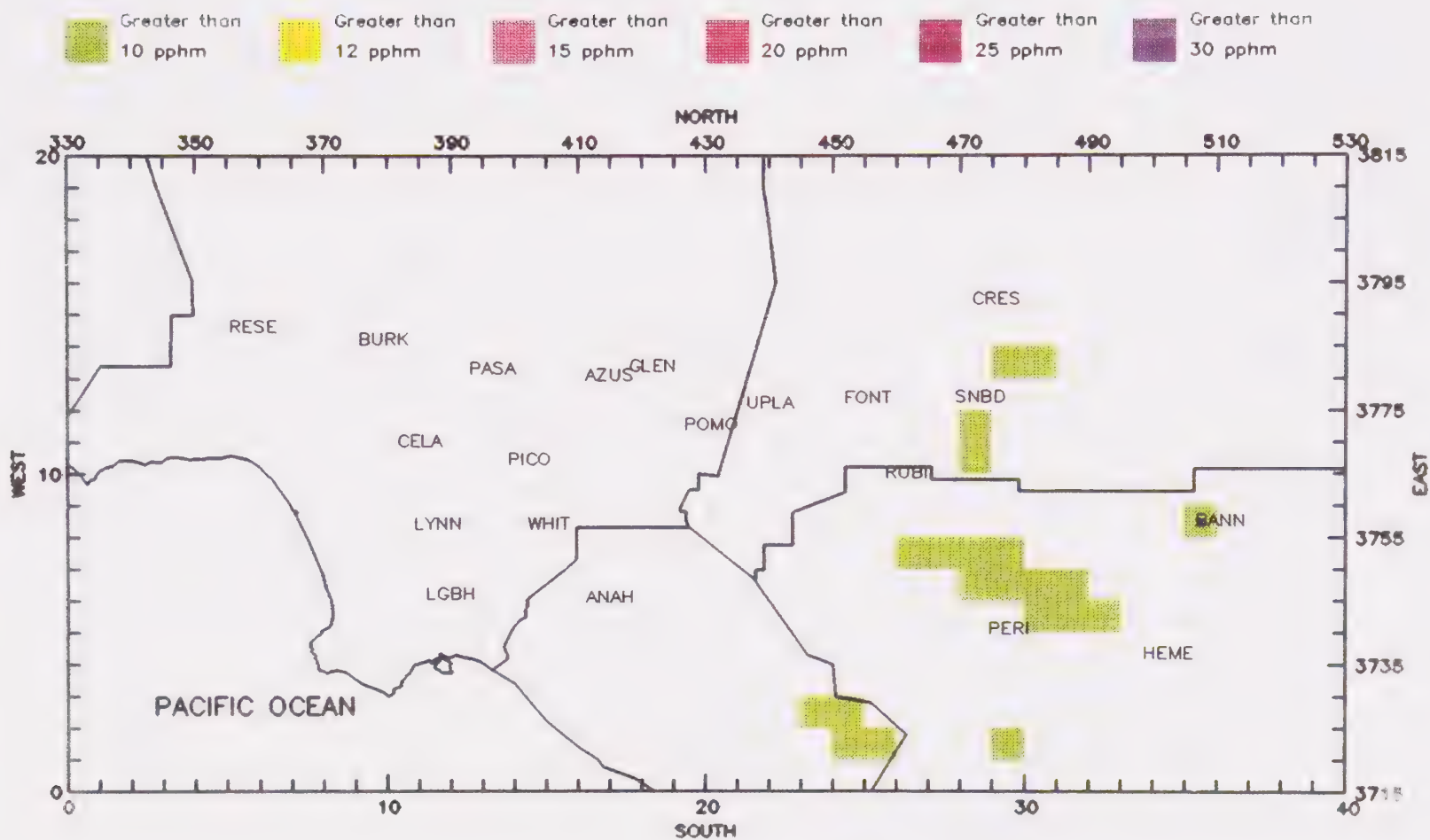


FIGURE 5-14

Model-Predicted Maximum Hourly Ozone Concentrations in the South Coast Air Basin in 2010 with Implementation of Proposed Emission Controls

Carbon Monoxide

A modified rollback approach based on gridded emissions data was used to evaluate future CO air quality (see Technical Report V-I). CO emissions for both typical summer and winter days are available for the 1991 AQMP whereas the average summer day CO emissions were used for the 1989 AQMP.

The results of the modified rollback indicate that (1) the entire Basin complies with the federal 1-hour average CO standards at the present time and will remain in compliance in the year 2000 without additional controls; (2) implementation of the proposed control strategy will bring the Basin into compliance with the state 1-hour standard before the year 2000 and compliance will be maintained through the year 2010; (3) the proposed control strategy will bring the entire Basin into compliance with the federal 8-hour standard by the year 2000; however, the state 8-hour standard will not be met at Lynwood, where one exceedance is projected to occur in a three-year period; and (4) implementation of all control measures by the year 2005 will bring the entire Basin in compliance with all federal and state standards. The rollback analysis was performed using the highest observed 8-hour concentrations in a three-year period. ARB's recommended guidelines on design day calculation allow the elimination of extreme concentrations; and the ARB and the District will further review the data to determine if the design values should be adjusted based on this consideration. If lower CO concentrations are used in the analysis, the Basin will be in compliance of all standards by 2000.

The 8-hour average standard is considered more stringent than the 1-hour average standard. The number of exceedances of the state 8-hour and 1-hour standards and the maximum CO concentrations are presented in Table 5-4. The number of exceedances of the two federal standards and the maximum CO concentrations are presented in Table 5-5. Note that the federal standard allows for no more than one violation per year. Thus, the second highest CO concentrations are presented in Table 5-5.

Figure 5-15 presents baseline and projected future-year peak 8-hour average CO concentrations for the five stations reporting the highest CO concentrations. It is projected that future CO concentrations will not exceed the standard at all other Basin monitoring stations.

TABLE 5-4

Projected Carbon Monoxide Air Quality in the South Coast
Air Basin As Compared to the State Standards

Scenario	Number of Exceedances*		Maximum Concentration (ppm)	
	1-hr	8-hr	1-hr	8-hr
1986-1988 Period	98	401	32.0	27.5
2000 Baseline	0	19	18.0	15.5
2010 Baseline	7	82	21.6	15.5
2000 Control	0	1	12.2	10.5
2010 Control	0	0	8.8	7.6
State Standard			20.0	9.0

* State standards do not allow any exceedances.

TABLE 5-5

Projected Carbon Monoxide Air Quality in the South Coast
Air Basin As Compared to the Federal Standards

Scenario	Number of Exceedances*		Maximum Concentration (ppm)	
	1-hr	8-hr	1-hr	8-hr
1986-1988 Period	0	335	31.0	23.4
2000 Baseline	0	15	17.4	13.1
2010 Baseline	0	53	20.0	13.0
2000 Control	0	1	11.8	8.9
2010 Control	0	0	8.5	6.4
Federal Standard			35.0	9.5

* Federal standards are allowed to be exceeded once per year and the second highest concentrations in any of the three years are presented.

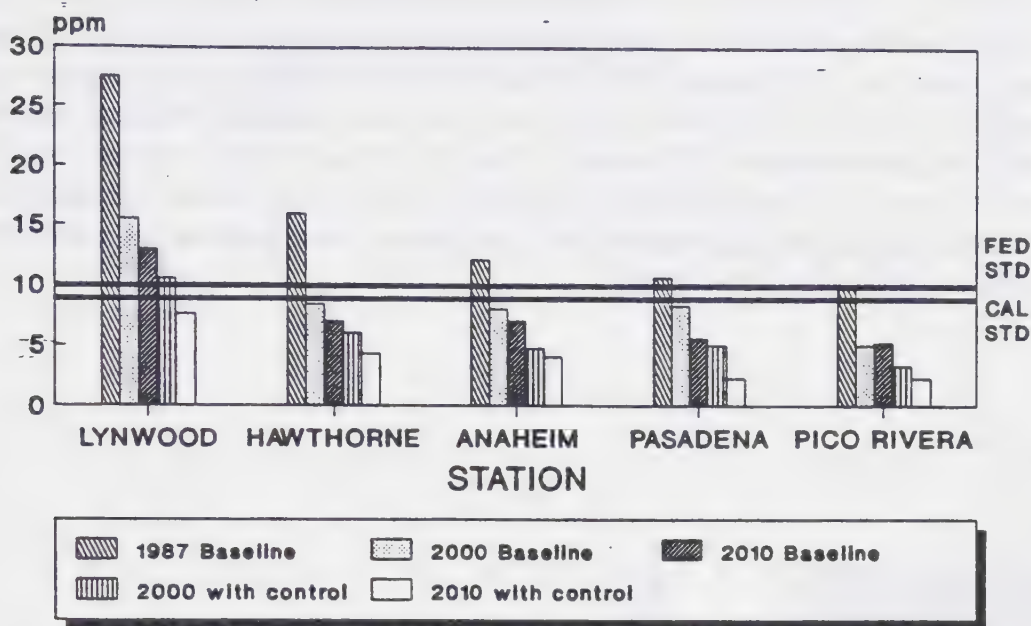


FIGURE 5-15

Maximum 8-hour Average Carbon Monoxide Projections
in the South Coast Air Basin

Visibility

Future-year visibility in the Basin was projected using the results derived from a regression analysis of visibility with air quality measurements. The regression data set consisted of aerosol composition data collected during a special monitoring program conducted concurrently with visibility data collection (prevailing visibility observations from airports and visibility measurements from District monitoring stations). A full description of the visibility analysis is given in Technical Report V-G.

The results of the visibility analysis are illustrated in Figure 5-16. Without the proposed AQMP control measures, annual average visibility is projected to improve throughout the Basin between 0.3 to 1.4 miles by the year 2000 from the current average of 5 to 9 miles; however, visibility will degrade by 2010.

With the implementation of all proposed emission controls for 2010, the annual average visibility would improve to about 26 miles in the coastal areas and about 14 to 16 miles in the inland areas. In addition, the coastal and western portions of the Basin will meet the state visibility standard by 2010 with implementation of all emission controls. However, the eastern portion will not meet the standard during the next 20 years. An additional reduction of about 5 percent in ambient fine particulate concentrations is needed to achieve basinwide compliance.

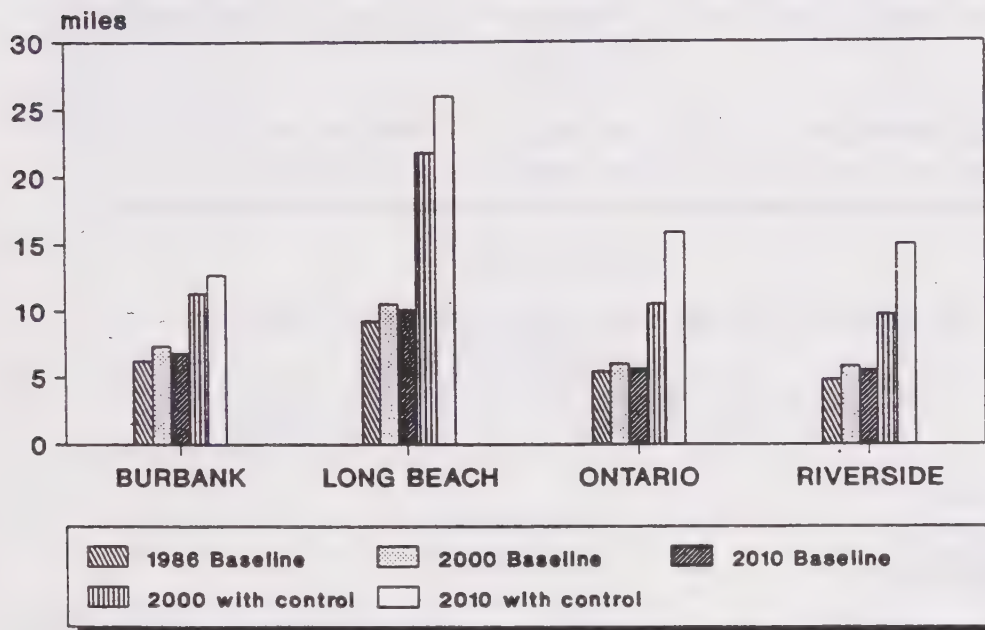


FIGURE 5-16
Annual Average Daytime Visibility Projections

VI CALIFORNIA CLEAN AIR ACT REQUIREMENTS





Stephanie Corchnoy student, Statewide Air Pollution Research Center, University of California, Riverside

Rooting for Clean Air

Stephanie Corchnoy, a junior in the chemistry department at the University of California, Riverside is studying the hydrocarbon emissions of over a dozen shade trees. Least emitting are crape myrtle and camphor trees. Large-scale planting of low-emitting trees are advantageous because they provide shading and consequently reduce energy use which in turn reduces pollution.

CHAPTER 6

CALIFORNIA CLEAN AIR ACT REQUIREMENTS

Introduction

Emission Reductions

Transportation Standards

Populational Exposure

Control Measure Ranking

BARCT Requirement

INTRODUCTION

The California Clean Air Act (CCAA) was signed into law on September 30, 1988 and became effective on January 1, 1989. Also known as the Sher Bill (AB 2595), the CCAA established a legal mandate to achieve health-based state air quality standards at the earliest practicable date. Through its many requirements, the CCAA serves as the centerpiece of the Basin's attainment planning efforts since it is generally more stringent than the 1990 federal Clean Air Act (CAA).

Based on pollutant levels, the CCAA divides nonattainment areas into three categories with progressively stringent requirements: moderate, serious and severe (Health and Safety Code (H&SC) 40918-40920). The Basin is a severe nonattainment area for ozone, carbon monoxide, and nitrogen dioxide. Fine particulate matter (PM₁₀) is not specifically addressed in the CCAA. The Basin is nearing attainment for sulfates and has met attainment goals for all other criteria pollutant standards.

Severe nonattainment areas are required to revise their air quality management plan to include specified emission reduction strategies and to meet milestones in implementing emission controls and achieving more healthful air quality. The new control requirements include: an indirect and area source control program (H&SC 40918(a)(4)), best available retrofit control technology (BARCT) for existing sources (H&SC 40919(a)(4)), a program to mitigate all emissions from new and modified permitted sources (H&SC 40919(a)(2)), consideration of transportation control measures (H&SC 40918-40920), and significant use of low-emission vehicles by fleet operators (H&SC 40920(a)(3)). All of these controls have already been implemented through District regulations or are included in the 1991 AQMP.

The CCAA also includes some additional requirements that can significantly affect control strategy selection. They are as follows: reducing pollutants contributing to nonattainment by 5 percent per year (H&SC 40914), achieving an average commuter ridership of 1.5 persons per vehicle by 1999 (H&SC 40920(a)(2)), no net increase in mobile source emissions after 1997 (H&SC 40920(a)(2)), substantial decrease in growth VMT and vehicle trips (H&SC 40919(a)(3)), public education programs (H&SC 40918(a)(6)),

reducing populational exposure to severe nonattainment pollutants according to a prescribed schedule (H&SC 40920(a)(4)), and ranking control measures by cost-effectiveness and implementation priority (H&SC 40922). Each of these requirements is discussed in detail in this chapter.

The federal CAA, adopted November 15, 1990, does establish some unique requirements. Specifically, it contains amendments that are pertinent to control measure requirements. These amendments will be considered and incorporated into the first Plan amendment under the 1990 CAA. These amendments cannot be incorporated until the Environmental Protection Agency (EPA) issues its guidance on the recent changes, which will not be available until November 1991. That is much later than the adoption date for the 1991 AQMP--July 12, 1991.

EMISSION REDUCTIONS

According to the CCAA, districts must design their air quality management plan to achieve a reduction in basinwide emissions of 5 percent or more per year (or 15 percent or more in a three-year period) for pollutants causing severe nonattainment (H&SC 40914). However, an air basin may use an alternative emission reduction strategy which achieves a reduction of less than 5 percent per year if it can be demonstrated that either of the following applies:

- o The alternative emission reduction strategy is equal to or more effective than the 5 percent per year control approach in improving air quality.
- o That despite the inclusion of every feasible measure, and an expeditious adoption schedule, the air basin is unable to achieve the 5 percent per year reduction in emissions.

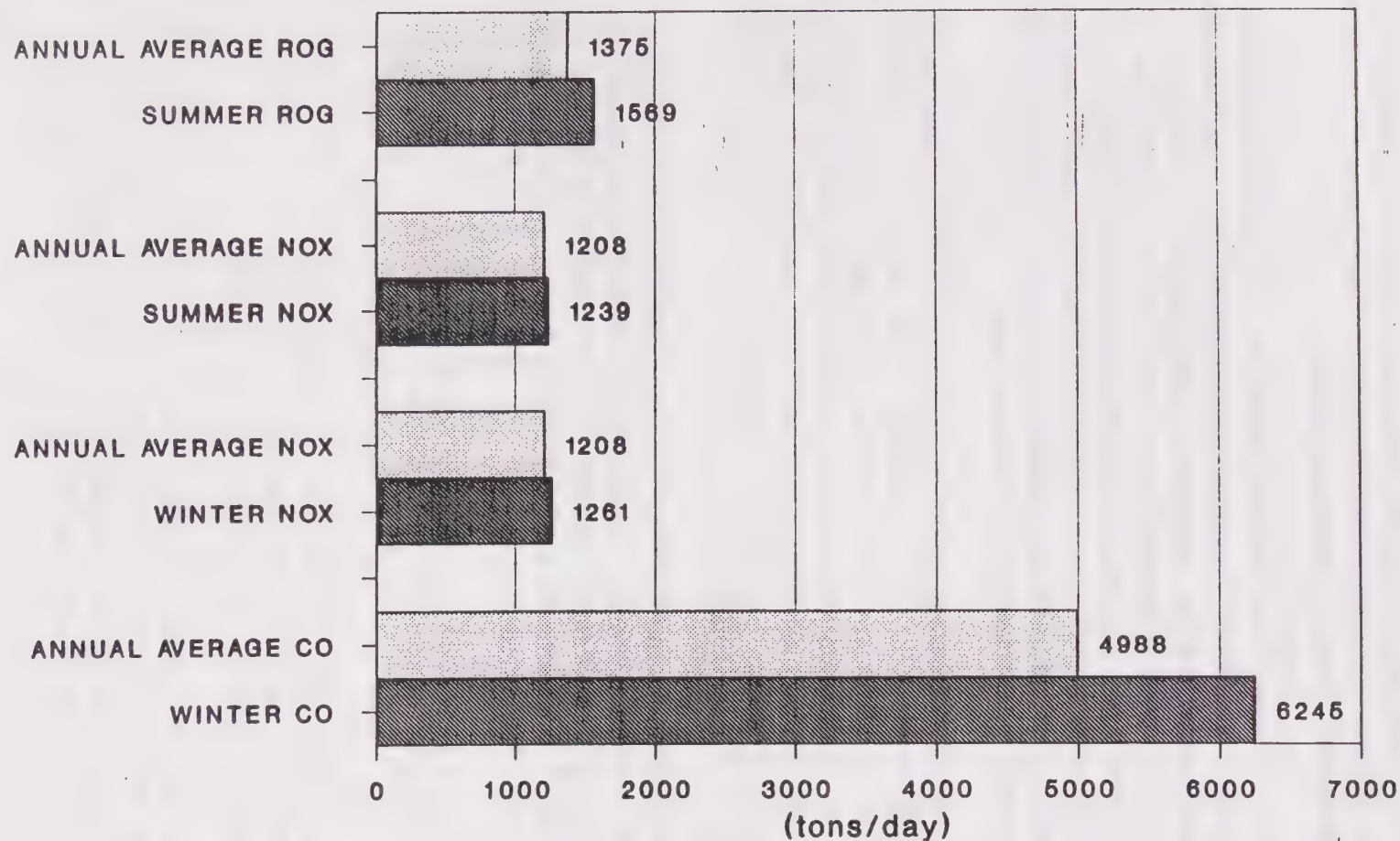
For emission reduction accounting purposes, the ARB has established a seven-year initial reporting period from January 1, 1988, to December 31, 1994 (Section 70701 of the California Code of Regulations). The reporting intervals after this initial period occur every three years (i.e., 1997, 2000,

etc.). Therefore, the 1991 AQMP must seek to achieve a 35 percent emissions reduction for the initial reporting period and a 15 percent additional reduction for every subsequent interval.

The ARB has also developed "planning inventories" to characterize emissions during periods when air quality standards are exceeded and to serve as the basis for emission reduction accounting (Appendix III-C). As shown in Figure 6-1, the planning inventories are 3 to 25 percent higher than the comparable annual average emission inventories presented in Chapter 3. This difference is primarily due to seasonal temperature changes and the corresponding effects on pollutant emission rates (e.g., higher solvent and gasoline evaporative emissions on hot summer days).

Table 6-1 presents baseline emissions and estimated emission reductions for the reporting periods 1994, 1997, and 2000. These estimates are based on the adoption and implementation schedules contained in Chapter 7 and represent the maximum feasible control program. As shown, the CCAA's 1994 and 2000 emission reduction targets can be achieved for ROG and the 1994 emission reduction target for CO. However, all other targets for ROG, CO, and NO_x cannot be achieved.

Although the options to improve the Plan's performance in the early years are limited, additional options for near-term emission reductions through measures that affect near-term emissions (such as reformulated gasoline and SMOG CHECK improvements) will be sought to remedy these shortfalls during the draft Plan's review process.

**FIGURE 6-1**

Comparison between Average Annual Day and Planning Inventory Emissions
1987 Base Year

TABLE 6-1
Summary of 1991 AQMP Controlled Emissions Based on Planning Inventory Emissions
(Tons/Day, Percent)^a

Inventory Pollutant	ROG	O ₃	NO _x	NO ₂ NO _x	CO CO
1987 Baseline	1569 100%		1239 100%	1261 100%	6245 100%
Emission Reduction					
1994 CCAA Requirement	610 39% 35%		306 25% 35%	308 24% 35%	2473 40% 35%
1997 CCAA Requirement	744 47% 50%		473 38% 50%	477 38% 50%	3010 48% 50%
2000 CCAA Requirement	1044 67% 65%		608 49% ^b 65%	617 49% ^b 65%	3453 55% ^b 65%

a: Emission reductions are estimated as the 1987 equivalent.

b: Attainment of federal air quality standards.

Since the analysis presented in Table 6-1 is based on maximum feasible controls, the control measure implementation schedule cannot be shifted forward to provide earlier emission reductions. Similarly, the control measure mix has been evaluated to determine if an alternative mix would provide better air quality in the Basin. However, no such mix has been found. Therefore, the 1991 AQMP relies on maximum feasible controls as the means of complying with the CCAA emission reduction requirements.

TRANSPORTATION STANDARDS

Passenger Vehicle Occupancy

The CCAA requires severe nonattainment areas to achieve an average of 1.5 or more persons per vehicle during commute hours by 1999 (H&SC 40920 (a)(2)). The 1991 AQMP revision contains strategies directed at increasing average vehicle ridership (AVR) during commute hours. These strategies are incorporated in six SCAG measures and three District measures. The SCAG measures are as follows: Person Work Trip Reduction, Non-Motorized Transportation, Employer Rideshare and Transit Incentives, Parking Management, HOV Facilities, and Transit Improvements. The District measures are as follows: Enhanced Regulation XV, Trip Reduction for Schools, and Special Activity Center Trip Reduction.

The current Regulation XV sets an AVR target of 1.5 or higher for businesses employing 100 or more employees at one site. It is estimated that this measure will increase AVR from 1.13 to 1.3 for regionwide commute trips. To meet more stringent CCAA mandate the District and SCAG measures call for a wide variety of actions such as the following: lowering the employee threshold for affected employers, including multi-tenant buildings with employees exceeding the threshold, increasing the AVR targets, including schools under Regulation XV, providing funding for HOV facilities and transit improvements, using parking fees to discourage single-occupant commuting, and providing facilities for commuting bicyclists. The proposed enhancements to Regulation XV will maintain the ability of employers to utilize a number of strategies to demonstrate compliance, such as ridesharing, telecommuting, and alternative work week scheduling. The combination of SCAG and District measures has been designed to meet the

1.5 persons per passenger vehicles requirement by 1999.

The substantial gains in AVR are necessary for the region to achieve the 1.5 persons per vehicle standard by 1999. Through implementation of the transportation and indirect source control measures the regionwide average number of passengers per vehicle (including transit) while commuting to work from home will increase from 1.21 to 1.51 by 1999. These figures are derived from SCAG's Regional Transportation Model by dividing total person trips (including transit trips and telecommutes) by the total vehicle trips for both 1987 baseline and control scenario.

No Net Increase in Mobile Source Emissions

The CCAA requires severe nonattainment areas to have no net increase in vehicle emissions after 1997 (H&SC 40920(a)(2)). The 1991 AQMP contains a comprehensive strategy to reduce emissions that includes reducing tailpipe emissions and clean fuels through the ARB's motor vehicle program, reducing emissions from vehicles idling on congested roadways through SCAG's facility improvements and enhancements control measures, and reducing the number and length of vehicle trips through SCAG's transportation control measures and the District's indirect source control measures. The on-road mobile source control strategy is described in Chapter 4.

This strategy results in the 1991 AQMP achieving the no net increase in vehicle emission requirement of the CCAA. The baseline emissions inventory for on-road mobile sources in 1997 is 318 tons/day ROG, 448 tons/day NO_x, and 2682 tons/day CO. Through implementation of the mobile source control strategy, on-road mobile-sources are reduced in 1997 to 221 tons/day ROG, 380 tons/day NO_x, and 1773 tons/day CO, and in 2000 to 179 tons/day ROG, 337 tons/day NO_x, and 1405 tons/day CO. This is based on a Controlled Emissions Projection Algorithm (CEPA) model run of the baseline and control strategy utilizing the annual average emissions inventory.

Reduce Growth in VMT and Vehicle Trips

The CCAA requires serious and severe non-attainment areas to substantially reduce the rate of growth in passenger vehicle trips and vehicle miles

traveled (H&SC 40919 (a)(3)). The nine 1991 AQMP control measures directed at increasing the region's average vehicle ridership also serve to eliminate vehicle trips and reduce vehicle miles traveled. By 2010 VMT and vehicle trips are projected to increase by 58% and 35% respectively if no further transportation control measures are implemented. With the transportation control strategy implemented, VMT and vehicle trips will be increased by only 36% and 22% respectively. This is based on SCAG's Regional Transportation Model runs for the 1991 AQMP.

POPULATIONAL EXPOSURE

The CCAA also requires that the 1991 AQMP control measures reduce overall population exposure to criteria pollutants. Specifically, exposure to severe nonattainment pollutants above standards must be reduced by at least 25 percent by December 31, 1994; 40 percent by December 31, 1997; and 50 percent by December 31, 2000. Reductions are to be calculated based on per capita exposure and the severity of exceedances. This provision is applicable to ozone, CO and NO₂ in the Basin (H&SC 40920(a)(4)). The definition of exposure is the number of persons exposed to a specific pollutant concentration level above the state standard times the number of hours. The per capita exposure is the population exposure (units of pphm-persons-hours) divided by the total population.

Ozone

For the 1991 AQMP, two approaches have been used to estimate per capita exposure reduction for ozone. The first approach, the Ambient Population Exposure (APEX) model, uses ambient measurements for the years 1986 to 1988 to estimate base-year exposure levels. APEX then estimates future-year exposure using residential population forecasts. However, the model does not consider time spent indoors or mobility factors.

The second approach, called the Regional Human Exposure (REHEX) model, is more robust and considers population mobility; time spent indoors, outdoors and in transit; exposure by age classification; and activity pattern by season and weekday/weekend. In addition, REHEX utilizes future-year

predicted ozone concentrations from the Urban Airshed model (UAM) to project populational exposure.

Analysis using both models indicates that the CCAA exposure reduction targets will be achieved for ozone with a margin of safety. Thus, public health will be significantly improved with the 1991 AQMP. Figure 6-2 summarizes the results from the APEX and REHEX analyses and compares estimated exposure reductions to the targets.

The REHEX model also allows more detailed exposure reduction estimates by age group and county. These results are summarized in Figures 6-3 and 6-4. As shown, the greatest exposure reduction for an individual age class is for children who have longer exposure to outdoor concentrations and the geographic location with the most improvement for all age groups is the two inland counties.

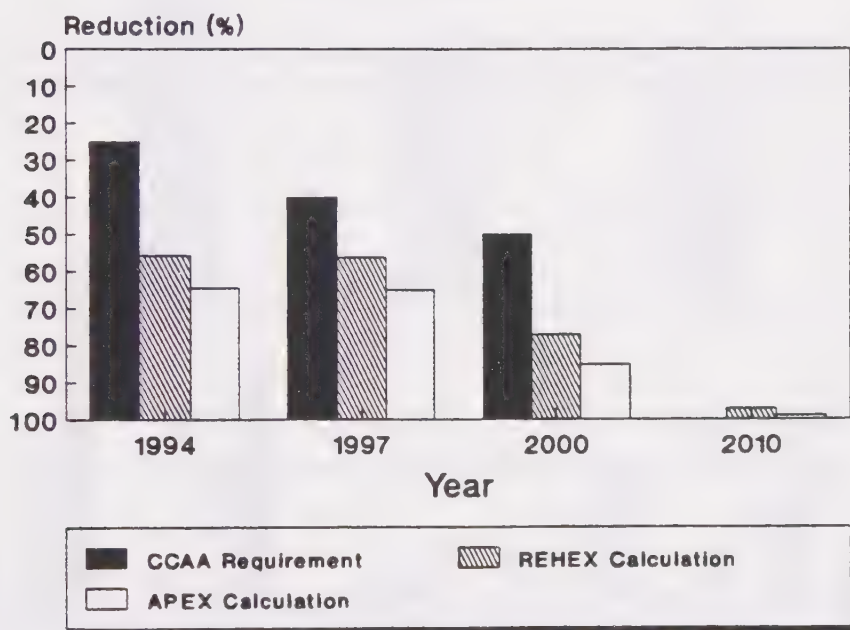


FIGURE 6-2

Projected Annual Average per Capita Exposure to Ozone Concentrations above the State Standard in the South Coast Air Basin

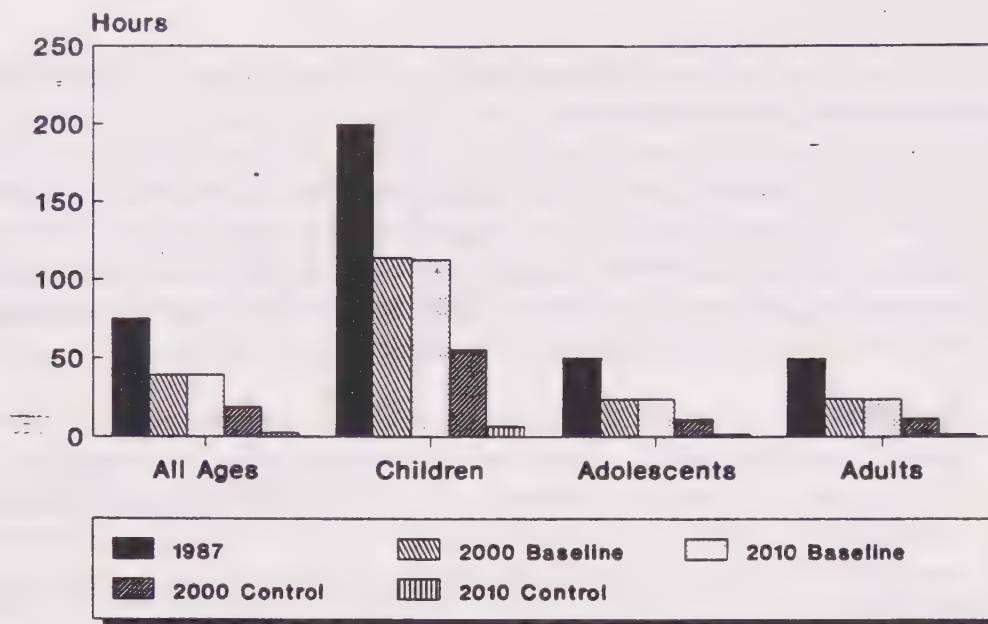


FIGURE 6-3

Projected Annual Average per Capita Exposure to Ozone Concentrations above the State Standard by Age Group in the South Coast Air Basin

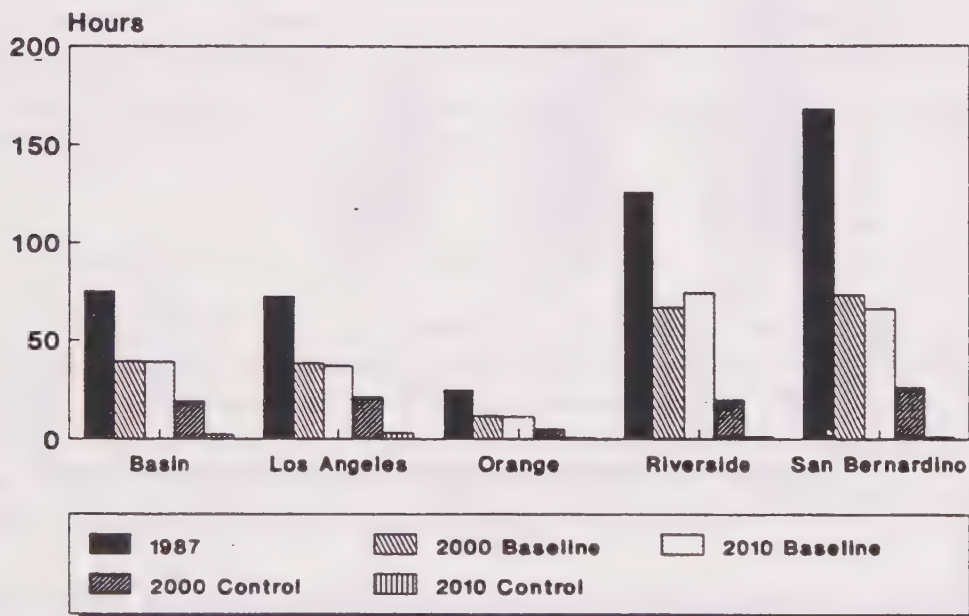


FIGURE 6-4

Projected Annual Average per Capita Exposure to Ozone Concentrations above the State Standard by County in the South Coast Air Basin

Carbon Monoxide

The APEX model has also been used to estimate CO exposure reduction due to the 1991 AQMP. The modeling results are displayed in Figure 6-5 for 1994, 1997, and 2000 as calculated from the 1986-1988 base period. As shown, the proposed control strategy will greatly exceed the CCAA reduction requirements for CO exposure. The REHEX model was not used in this analysis because of incomplete data for the indoor source impacts.

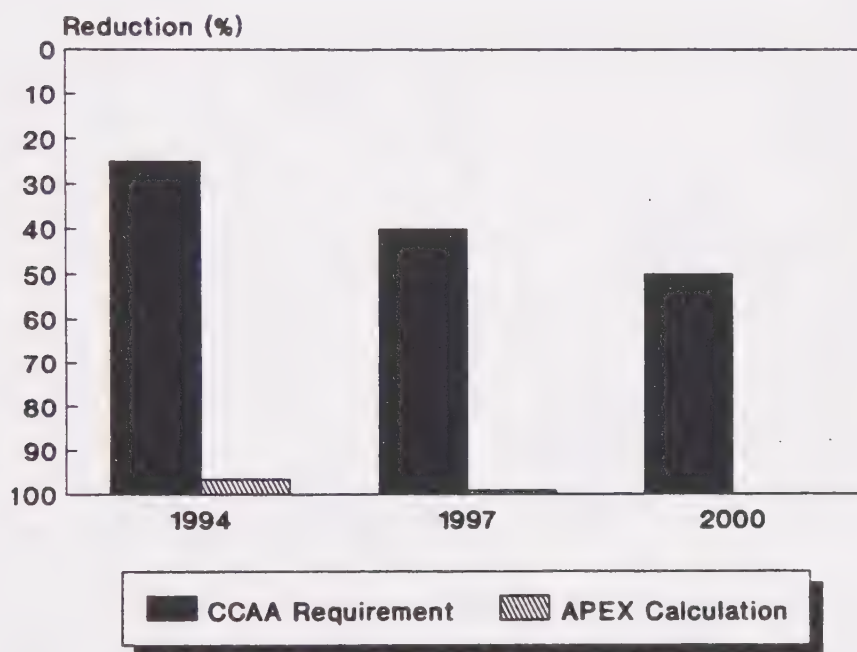


FIGURE 6-5

Projected Annual Average per Capita Exposure to Carbon Monoxide Concentrations above the State Standard in the South Coast Air Basin

Nitrogen Dioxide

The results of trend analyses indicate that downtown Los Angeles will be the only site in this Basin that will not meet the state NO_2 standard by 1994, may not meet it by 1997, but will meet it by 2000. However, the Basinwide per-capita average exposure reduction from the 1986-1988 base period as shown in Figure 6-6 will be reduced more than the 25 percent and 40 percent required for 1994 and 1997, respectively.

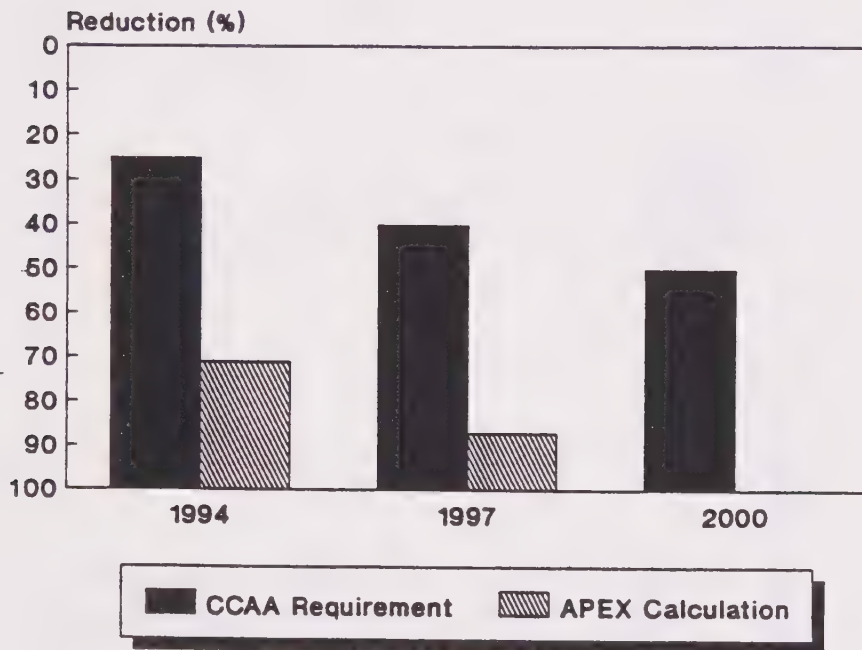


FIGURE 6-6

Projected Annual Average per Capita Exposure to NO_2 Concentrations above the State Standard in the South Coast Air Basin

CONTROL MEASURE RANKING

The CCAA requires the District Governing Board to determine that the AQMP is a cost-effective strategy that will achieve attainment of the state standards by the earliest practicable date (H&SC 40913(b)). In addition, the Plan must include an assessment of the cost-effectiveness of available and proposed measures and a list of the measures ranked from the least cost-effective to the most cost-effective (H&SC 40922).

Besides the relative cost-effectiveness of the measures, the District must consider other factors as well in developing an adoption and implementation schedule. The other factors noted in the CCAA include technological feasibility, emission reduction potential, rate of reduction, public acceptability, and enforceability. Efficiency, equity, and legal authority have also been included in the 1991 AQMP for prioritization purposes because of their importance (Table 6-2).

Assessing and weighting these factors is a difficult undertaking. To accomplish this task, the 1991 AQMP relies on a quantitative methodology that integrates the performance of control measures according to each criterion noted above and relative priorities among the criteria. The performance of each control measure for each criterion was determined by direct measurement (e.g., emission reduction potential) or by expert evaluations (e.g., enforceability). The relative priorities (weighting) among the criteria were determined from public surveys.

These results were then used as input to a computer program, called Assessment of Group Options with Reasonable Accord (AGORA), to determine the implementation schedules presented in Chapter 4. AGORA uses statistical analysis to identify the overall priority for each measure and then arranges the control measures in a rank order from highest priority to lowest. This ranking is substantially different from the one using relative cost-effectiveness as the only criterion. Table 6-3 provides a listing of 1991 AQMP control measures to be implemented by the District according to cost-effectiveness and their relative overall ranking by AGORA. The list does not include control measures for which cost-effectiveness could not be determined. Appendix VII-A provides a more detailed description of AGORA and the method used to develop control measure implementation schedules. Appendix IV-D of the 1989 AQMP provides a detailed description of the methodology used to calculate cost-effectiveness.

TABLE 6-2
Criteria For Evaluating
1991 AQMP Control Measures

<u>Criteria</u>	<u>Description</u>
Cost-Effectiveness	The cost of a control measure to reduce air pollution by one ton [cost covers obtaining, installing, and operating the control measure]
Efficiency	The positive effects of a control measure compared to its negative effects
Emission Reduction Potential	The total amount of pollution that a control measure can actually reduce
Enforceability	The ability to force polluters to comply with a control measure
Equity	The fairness of the distribution of all the positive and negative effects among various socio-economic groups
Legal Authority	The possibility that local governments and agencies will cooperate to approve a control measure
Public Acceptability	The support the public gives to a control measure
Rate of Emission Reduction	The time it will take for a control measure to reduce air pollution
Technological Feasibility	The likelihood that the technology for a control measure will be available as anticipated

Table 6-3

Ranking of Control Measures

AQMP No.	Title	Dollars/Ton (1987 Dollars)	Ranking By Cost-Effectiveness	Ranking By Implementation
M-G-8	Aerodynamic Device for Trucks (ROG, NO _x , CO, PM ₁₀)	(\$6,800)	1	12
M-G-2	Low-Emission Retrofit of Transit Buses (NO _x , PM ₁₀ , SO _x)	Savings	2	16
M-I-7	Eliminate Leaf Blowers (All Pollutants)	Savings	3	24
M-G-9	Eliminate Emissions from Advertising Vehicles (All Pollutants)	Savings	4	47
M-I-8	Emission Standards for Construction and Farm Equipment (ROG, NO _x , PM ₁₀)	\$100	5	7
A-B-2	Control of Emissions from Gasoline Transfer, Phase-II (ROG)	\$130	6	*
M-G-10	Eliminate CFC-Based Transport Refrigeration Systems (All Pollutants)	\$200	7	8
P-A-4	Further Emission Reductions from Metal Cleaning and Degreasing (ROG)	\$220	8	**
A-B-5	Further Control of Emissions from Gasoline Dispensing Facilities (ROG)	\$230	9	15
A-A-2	Substitute Solvents Used for Clean-up of Surface Coating (ROG)	\$300	10	*
A-E-3	Control of Dust Emissions from Agricultural Tilling (PM ₁₀)	\$550	11	50
M-H-1	Environmental Review Program (ROG, NO _x , CO)	\$640	12	*
A-F-5	Control of Dust Emissions from Wind Erosion (PM ₁₀)	\$720	13	2
A-E-2	Control of Emissions from Livestock Waste (ROG, PM ₁₀ , NH ₃)	\$960	14	5
M-G-12	Oxygenated Fuels Program (CO)	\$1,000	15	1
A-B-6	Control of Emissions from Utility Engine Refueling Operations (ROG)	\$1,100	16	9
A-B-3	Control of Emissions from Pleasure Boat Fueling Operations (ROG)	\$1,200	17	44
M-H-2	Trip Reductions for Schools (ROG, NO _x , CO)	\$1,300	18	*
P-C-8	Further Emission Reductions from Cement Kilns (NO _x)	\$1,300	19	14
A-E-1	Control of Emissions from Pesticide Application (ROG)	\$1,300	20	30
M-H-3	Supplemental Development Standards (ROG, NO _x , CO)	\$1,700	21	18
P-B-7	Further Control of Emissions from Bulk Terminals (ROG)	\$2,100	22	23
A-B-9	Control of Emissions from Active Draining (ROG)	\$2,260	23	28
M-G-5	Motor Vehicle Buyback Program (ROG, NO _x , CO)	\$3,300	24	36

* - Under current rule adoption schedule.

** - Has been adopted as a rule.

Table 6-3
Ranking of Control Measures
(Continued)

AQMP No.	Title	Dollars/Ton (1987 Dollars)	Ranking By Cost-Effectiveness	Ranking By Implementation
A-C-1	Control of Emissions from Large Commercial Bakeries [ROG]	\$3,500	25	**
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	\$3,800	26	*
A-F-2	Control of Emissions from Construction, Demolition, and Onsite Vehicular Flow [PM10]	\$4,650	27	3
A-C-2	Control of Emissions from Commercial Charbroiling [ROG, PM10]	\$4,700	28	*
P-C-1	Further Emission Reductions from Rubber Products Manufacturing [ROG, PM10]	\$4,900	29	*
P-A-3	Further Emission Reductions from Paper, Fabric, and Film Coating [ROG]	\$5,000	30	*
M-I-5	Limit Sulfur Content of Marine Fuel Oils [SO _x]	\$5,200	31	6
M-I-4	Control of Emissions from Marine Diesel Operations [NO _x]	\$5,400	32	17
P-A-5	Further Emission Reductions from Perchloroethylene Dry Cleaning Operations [ROG]	\$7,200	33	27
P-C-5	Control of Emissions from Metal Melting Furnaces [NO _x]	\$7,500	34	48
P-B-5	Control of Emissions from OCS Exploration, Development, and Production [All Pollutants]	\$9,200	35	11
P-C-6	Control of Emissions from Curing and Drying Ovens [NO _x]	\$9,300	36	45
P-F-1	Phase-Out Stationary Sources Fuel Oil and Solid Fossil Fuel Use [ROG]	\$11,300	37	*
P-C-3	Control of Emissions from Woodworking Operations [PM10]	\$12,000	38	19
P-B-3	Control of Emissions from Gas Fired Petroleum Refinery Process Heaters [PM10]	\$12,000	39	46
P-C-4	Control of Emissions from Small Boilers and Process Heaters [NO _x]	\$12,900	40	*
P-C-7	Further Emission Reductions from Glass Melting Furnaces [NO _x]	\$18,400	41	42
P-A-2	Further Emission Reductions from Automobile Assembly Coating [ROG]	\$19,000	42	54
M-G-11	Inspection and Maintenance Program Enhancement [ROG, NO _x , CO]	\$20,000	43	20
A-F-1	Installation of BARCT on Miscellaneous Sources [All Pollutants]	\$23,000	44	13
M-I-1	Control of Emissions from Ship Berthing Facilities [NO _x]	\$25,300	45	31
P-B-4	Improved Control of Emissions from Petroleum FCC Units [PM10]	\$29,300	46	*
P-B-1	Control of Emissions from Petroleum FCC Units [SO _x]	\$30,000	47	*
M-G-1	Zero-emission Urban Bus Implementation [ROG, NO _x , CO, PM10]	\$30,000	48	34
P-C-2	Control of Emissions from Afterburners [NO _x]	\$62,200	49	*

* - Under current rule adoption schedule.

** - Has been adopted as a rule.

BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY (BARCT) REQUIREMENT

The CCAA requires that 75 percent of the permitted stationary source ROG and NO_x emissions inventory be subject to the Best Available Retrofit Control Technology (BARCT) by January 1, 1994. A review of stationary source rules and regulations that have been adopted since January 1988 or are expected to be adopted by January 1, 1994 indicates that this requirement has been met. Percentages of total permitted emissions subject to BARCT requirements to the total stationary source emissions are presented in Table 6-4.

TABLE 6-4
Emissions Subject to BARCT Requirements
1987 Planning Inventory (Tons/Day)

	ROG	NO _x
Sources subject to BARCT	804	301
Total stationary sources	813	303
Percent subject to BARCT	99	99
CCAA requirement	75	75

VII IMPLEMENTATION





Steve Hauerwaas, Recycling Coordinator, Duarte City Hall

Duarte: A City That's Picking Up

Duarte was the first city in the San Gabriel Valley to have a residential curbside recycling program. Since its start in March 1988, half of the city's 4,200 households participate. Pick-up service is provided for all types of recyclables and will soon be expanded to include commercial sites. The program was initiated by the city council under Mayor John Hitt and Assistant City Manager Don Pruyn.

CHAPTER 7

IMPLEMENTATION

Introduction

Tier I Implementation

Tier II Implementation

Tier III Implementation

Implementation Support Activities

Congestion Management Program Linkage with the AQMP

CEQA Review Process Linkage with the AQMP

Monitoring the AQMP

INTRODUCTION

The implementation program for the 1991 AQMP relies on a multi-level partnership of governmental agencies at the federal, state, regional, and local level. These agencies will form four cornerstones from which implementation programs will evolve. At the federal level is the EPA and other agencies charged with reducing emissions from federally controlled sources such as airplanes. At the state level is principally the ARB which is responsible for motor vehicle emissions and fuels. At the regional level is the District which is charged with the overall development and implementation of the AQMP, as well as reducing emissions from industries, and some mobile sources and consumer products. At the local level is local government and the Southern California Association of Governments (SCAG). Local governments are responsible for implementing the transportation and land use measures in the AQMP. SCAG provides assessments conformity of regionally significant projects with the AQMP and adopting the annual Regional Transportation Improvement Program.

In many cases, each of these government agencies is empowered with authority unique to that agency, and, as such may be the only feasible party to implement a measure. A summary of the four cornerstones and their responsibilities is as follows:

AGENCY	RESPONSIBILITIES
EPA	<ul style="list-style-type: none">o Forty-nine state mobile vehicle emission standards;o Airplanes, trains, and ships;o Construction & farm equipment; and,o Off-shore oil development.

AGENCY	RESPONSIBILITIES
ARB	<ul style="list-style-type: none"> o On-road/Off-road vehicles, o Motor vehicle fuels; and, o Consumer products.
SCAQMD	<ul style="list-style-type: none"> o Stationary (industry/commerce) & area sources; o Some mobile sources; o Some consumer products, and o Indirect sources & TCM's.
SCAG/ Local Government/ CTCs	<ul style="list-style-type: none"> o AQMP conformity assessment o Adoption of Regional Transportation Improvement Program o Transportation and land use measures; o Transportation facilities.

TIER I IMPLEMENTATION

The Tier I component of the AQMP is action-oriented. It identifies specific control measures for which control technology currently exists. For the most part, these measures can be adopted within the next several years. They consist mainly of stationary source controls that will be the subject of District rules and ARB-adopted motor vehicle emissions standards and fuel specifications, and federally adopted programs to reduce emissions from sources under federal government jurisdictions. There are also several indirect source control measures that are new to the 1991 AQMP. Many of

these measures will be structured so they can be implemented by local governments. Local governments will also be responsible for many of the Tier I transportation, land use, and energy conservation measures.

Federal Agencies

The 1991 AQMP contains seven Tier I control measures aimed at controlling emissions from federally regulated sources including planes, ships, trains, most construction and farm equipment, off-highway vehicles, federal facilities, and future OCS (off-shore oil) operations.

Federally regulated sources, excluding motor vehicles, contribute 3 percent of total ROG emissions and 11 percent of NO_x emissions in the Basin, and, therefore, should be subject to the most feasible reduction requirements. The emissions reduction potential associated with these measures is estimated to be 23 tons per day of ROG, 60 tons per day of NO_x, and 32 tons per day of CO in 2010. The control measures for federally regulated sources are listed in Table 7-1.

It should be noted that motor vehicles originating out-of-state could also be characterized as "federally regulated" sources. Currently, these vehicles constitute approximately 20 percent of the in-use vehicle fleet, which corresponds to 1.2 million vehicles. Since emission standards for out-of-state vehicles are less stringent than California vehicles, the potential emissions penalty associated with out-of-state vehicles in 2010 can be as much as 14 tons per day ROG, 67 tons per day CO, and 19 tons per day of NO_x.

EPA will also have the lead in working with other federal agencies to implement some of the AQMP control measures. This will involve working with the Department of Interior to reduce emissions from off-shore oil development, the Department of Defense and Coast Guard to reduce emissions from military aircraft and marine vessel operations, and the Federal Aviation Administration to reduce emissions from aircraft engines. In addition, the AQMP calls for EPA to work with Federal Highway Administration and Department of Transportation to ensure that federally funded transportation projects are consistent with the AQMP.

TABLE 7-1⁽¹⁾⁽²⁾
Federal Government - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
P-B-5	Control of Emissions from OCS Exploration, Development and Production [All Pollutants]	DOI/EPA/ SCAQMD	1992	1996	IV-A
M-G-12	Oxygenated Fuels Program [CO]	EPA/ARB	1991	1992	IV-C
M-I-2	Control of Emissions from Jet Aircraft [ROG, CO, NO _x]	EPA	1992	1996-2000	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/EPA/ARB/ Ports of L.A. & L.B./U.S. Coast Guard	1991	1994-1997	IV-C
M-I-6	Low Emissions from Military Aircraft [ROG, CO, NO _x]	DOD	1993	2000-2005	IV-C
M-I-8	Emission Standards for Construction and Farm Equipment [ROG, NO _x , CO, PM ₁₀] (175 HP and less)	EPA	1993	1997	IV-C
9	Replacement of High Emitting Aircraft [All Pollutants]	L.A. Dept. of Airports/FAA	12/91	1994	IV-E
14	Railroad Electrification [All Pollutants]	EPA/FRA	1995	2000	IV-E

(1) New control measures are shaded.

(2) The proposed adoption/implementation dates may be impacted by the Federal Clean Air Act requirements.

ARB

Many of the on-road mobile source control measures depend upon actions by the ARB to formulate strict exhaust emission standards and fuel quality requirements for passenger vehicles and trucks. The ARB is also responsible for adopting off-road mobile source emission standards, and along with the District, will be implementing the control measures in the AQMP directed towards reducing emissions from consumer products. Table 7-2 identifies the control measures that ARB (and other state agencies) will be responsible for implementing in the 1991 AQMP.

There are several other state agencies that will need to implement those control measures that fall within their authority. For example, the California Energy Commission and Public Utilities Commission will assist in implementing a variety of energy conservation-related control measures such as establishing energy efficiency standards and approving utility conservation programs. ARB will have a key role in working with these state agencies, along with the District, to ensure that these measures are implemented.

TABLE 7-2⁽¹⁾
ARB and Other State Agencies Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
ARB-1	Revised Emission Standards and Test Procedures for Medium-Duty Vehicles and Light Heavy-Duty Engines [ROG, CO, NO _x , PM ₁₀] ⁽²⁾	ARB	6/90	1995-1998	IV-F
ARB-2	Heavy-Duty Bus Particulate Trap Retrofit [PM ₁₀]	ARB	1993	(3)	IV-F
ARB-3	Revised Evaporative Emission Test Procedure [ROG] ⁽²⁾	ARB	8/90	1995-1998	IV-F
ARB-4	Improved Certification Requirement for Alternative Fuel Retrofit Systems [ROG, CO, NO _x]	ARB	1991	1992-1994	IV-F
ARB-5	Low Emission Vehicles And Clean Fuels Program [ROG, CO, NO _x , PM ₁₀] ⁽²⁾	ARB	9/90	1994-2003	IV-F
ARB-6	New Gasoline Specifications, Phase 2 Reformulated Gasoline [ROG]	ARB	9/91	1996	IV-F
ARB-7	Low Emission Vehicle Standards for Heavy-Duty Engines [All Pollutants]	ARB	1992	1998-2007	IV-F
ARB-8	Fleet Average Standards for Post-2003 Model Years (Passenger, Cars, Light-Duty Trucks, and Medium-Duty Vehicles) [All Pollutants]	ARB	1995	2004-2010	IV-F
ARB-9	Enhancements to Smog Check [ROG, NO _x , CO]	ARB	1993	(3)	IV-F
ARB-10	I/M for Light-Duty Diesel Vehicles [NO _x , PM ₁₀]	ARB	1992	(3)	IV-F

(1) New or modified control measures are shaded.

(2) This control measure has been adopted by the ARB.

(3) To be determined by ARB.

TABLE 7-2⁽¹⁾
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
ARB-11	Inspections of Fleet Heavy-Duty Trucks [ROG, NOx, CO, PM10]	ARB	1992	(2)	IV-F
ARB-12	Control of Off-Cycle Emissions [HC, CO, NOx, PM10]	ARB	1993	(2)	IV-F
ARB-13	Emissions Standards for Utility Engines [ROG, CO, NOx]	ARB	12/90	1994-1999	IV-F
ARB-14	Emission Standards for Construction and Farm Equipment [ROG, NOx, CO, PM10] (more than 175 HP)	ARB	9/91	1995-2000	IV-F
ARB-15	Emission Standards for Off-Road Motorcycles [ROG, CO, NOx]	ARB	5/91	1995	IV-F
ARB-16	Retrofit/Operational Requirements for Locomotives [All Pollutants]	ARB	1992	1992-1997	IV-F
ARB-17	Emission Standards for Marine Vessels [All Pollutants]	ARB	10/91	1997-1999	IV-F
ARB-18	Emission Standards for Off-Highway Vehicles [ROG, NOx, CO, PM10]	ARB	10/91	1995-2000	IV-F
A-A-3	Control of Emissions from Domestic Products [ROG]	ARB/SCAQMD	1991	2000	IV-B
A-B-7	Control of Emissions from Over-Filling of Vehicle Fuel Tanks [ROG]	SCAQMD/ARB	1993	1996	IV-B
A-E-1	Control of Emissions from Pesticide Application [ROG]	SCAQMD/CDFA	1993	1996	IV-B

(1) New or modified control measures are shaded.

(2) To be determined by ARB.

TABLE 7-2 (Continued)⁽¹⁾
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
M-G-11	Inspection and Maintenance Program Enhancement [ROG, CO, NOx]	SCAQMD/BAR	1993	1994	IV-C
M-G-12	Oxygenated Fuels Program [CO]	EPA/ARB	1991	1992	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/EPA/ARB Ports of L.A. & L.B./U.S. Coast Guard	1991	1994-1997	IV-C
2f	HOV Facilities [ROG, NOx, CO]	CALTRANS/CTC/ Local Gov't	(2)	(2)	IV-E
2g	Transit Improvements [ROG, NOx, CO]	CTC/UMTA/ Local Gov't/ CALTRANS/Public Transit Providers	(2)	(2)	IV-E
3a	Truck Dispatching, Rescheduling and Rerouting [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CALTRANS/CHP	12/93	1994	IV-E
4	Traffic Flow Improvements [ROG, NOx, CO]	CALTRANS/ Local Gov't/ CTC/SCAG	1989-2010	1994	IV-E

(1) New control measures are shaded.

(2) To be determined by ARB.

ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
5	Nonrecurrent Congestion [ROG, NOx, CO]	CALTRANS/CHP/ SCAG/SCAQMD/ CTC/Local Gov't	1994	1994	IV-E
11	Rail Consolidation to Reduce Grade Crossings [ROG, NOx, CO]	CALTRANS/Alameda Corridor Transp. Authority	1992	1997	IV-E
12a	Paved Roads [PM10]	SCAQMD/ARB/ Local Gov't/ CALTRANS/ Sanitation & Flood Districts	12/91	1994	IV-E
12b	Unpaved Roads [PM10]	ARB/CALTRANS/ Local Gov't	(1)	1994	IV-E
13	Freeway & Highway Capacity Enhancements [ROG, NOx, CO]	CALTRANS/SCAG/ CTC/FHWA/DMV/BAR	(1)	(1)	IV-E
16	High Speed Rail [ROG, NOx]	SCAG/Local Gov't/ CALTRANS/	12/91	1997	IV-E
E-D-1a	Residential Sector - Electricity Savings [NOx]	SCAQMD/CEC/ Local Gov't/PUC	1994	2007	IV-D

(1) To be determined by the implementing agencies.

TABLE 7-2 (Continued)⁽¹⁾
ARB and Other State Agencies - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants]	SCAQMD/ CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1a	Commercial Sector - Electricity Savings [NO _x]	SCAQMD/CEC/ Local Gov't/PUC	1993	2008	IV-D
E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1994	2009	IV-D
E-C-2a	Industrial Sector - Electricity Savings [NO _x]	SCAQMD/CEC/ Local Gov't/PUC	1994	2008	IV-D
E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2009	IV-D
E-C-2c	Industrial Sector - Glass Recycling [NO _x]	SCAQMD/CEC/ Local Gov't	1991	1998	IV-D
E-C-2d	Industrial Sector - Paper Recycling [NO _x]	SCAQMD/CEC/ Local Gov't	1994	2001	IV-D
E-C-3	Local Government Sector - Electricity and Natural gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2010	IV-D

(1) New control measures are shaded.

District

The District will be responsible for implementing control measures in the areas of stationary sources (point and area sources), mobile sources, and indirect sources (in a partnership with local governments). The description of the control approach in each of these measures is intended to represent a general control strategy to achieve the emission reduction targets and not to predetermine the specific terms of rules to be developed through the District's rule-making process. The stationary, area, and point source control measures will be implemented primarily through District rules and regulations.

Many of the area source control measures (in particular energy conservation) will be implemented with the assistance of the California Energy Commission, Public Utilities Commission, and local governments. Likewise, many of the mobile source control measures will be implemented with the assistance of the ARB and local governments.

While indirect source controls were called for in various SCAG-generated measures in the 1989 AQMP, the 1991 AQMP includes District-generated indirect source control measures. Section 40918(a)(4) of the CCAA requires the District to include indirect source control measures in the 1991 AQMP. In response to this mandate, the District has developed a program that is aimed at implementing those control measures that require regional consistency due to the characteristics of the type, length, destination, and origin of the vehicle trip; could place a jurisdiction at a competitive disadvantage if not applied consistently across the region; or require substantial technical air quality knowledge to successfully implement.

When possible, the District will develop the indirect source rules so that they provide regional consistency and technical assistance, but with the option for implementation at the local level for those local governments that choose to implement the program for their jurisdiction. For example, the District could adopt a rule with a future compliance date that would provide local governments the option of adopting the program at the local level prior to the date the District's rule would take effect.

Appendix IV-E calls for the District to adopt rules that would eliminate free parking (2b) and establish pollution charges for three-axle trucks, based on ROG, CO, and NOX emissions (3a). It is anticipated that local governments

will take the lead by adopting ordinances to achieve the targeted emissions reductions. If it is determined that local governments have not substantially complied with any control measure, the District will adopt a backstop rule to implement the measure. In developing the backstop rule, the District will consider a variety of control methods such as parking fees and truck emission charges. (Refer to the next several pages for schedule.)

Table 7-3 identifies the control measures that the District will be responsible for implementing in the 1991 AQMP.

TABLE 7-3⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
P-A-1	Further Emission Reductions from Wood Flatstock Coating [ROG] ⁽²⁾	SCAQMD	1991	1994	IV-A
P-A-2	Further Emission Reductions from Automobile Assembly Coating [ROG]	SCAQMD	1994	1997	IV-A
P-A-3	Further Emission Reductions from Paper, Fabric and Film Coating [ROG]	SCAQMD	1991	1994	IV-A
P-A-4	Further Emission Reductions from Metal Cleaning and Degreasing [ROG] ⁽²⁾	SCAQMD	1991	1992	IV-A
P-A-5	Further Emission Reductions from Perchloroethylene Dry Cleaning Operations [ROG]	SCAQMD	1993	1996	IV-A
P-A-6	Control of Emissions from Electronic Components Manufacturing [ROG]	SCAQMD	1994	1996	IV-A
P-B-1	Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units [SOx]	SCAQMD	1991	1995	IV-A
P-B-2	Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units [NOx]	SCAQMD	1994	1998	IV-A
P-B-3	Control of Emissions from Gas Fired Petroleum Refinery Process Heaters [PM10]	SCAQMD	1994	1997	IV-A

(1) New control measures are shaded.

(2) This control measure has been adopted as a rule.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
P-B-4	Improved Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units (PM10)	SCAQMD	1991	1995	IV-A
P-B-5	Control of Emissions from OCS Exploration, Development and Production (All Pollutants)	DOI/EPA/ SCAQMD	1992	1996	IV-A
P-B-6	Control of Emissions from Petroleum Refinery Flares (All Pollutants)	SCAQMD	1994	1996	IV-A
P-B-7	Further Control of Emissions from Bulk Terminals (ROG)	SCAQMD	1993	1996	IV-A
P-C-1	Further Emission Reductions from Rubber Products Manufacturing (ROG, PM10)	SCAQMD	1991	1994	IV-A
P-C-2	Control of Emissions from Afterburners (NOx)	SCAQMD	1991	1995	IV-A
P-C-3	Control of Emissions from Woodworking Operations (PM10)	SCAQMD	1993	1996	IV-A
P-C-4	Control of Emissions from Small Boilers and Process Heaters (NOx)	SCAQMD	1992	1996	IV-A
P-C-5	Control of Emissions from Metal Melting Furnaces (NOx)	SCAQMD	1994	1997	IV-A
P-C-6	Control of Emissions from Curling and Drying Ovens (NOx)	SCAQMD	1994	1997	IV-A
P-C-7	Further Control of Emissions from Glass Melting Furnaces (NOx)	SCAQMD	1994	1998	IV-A

(1) New control measures are shaded.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
P-C-8	Further Control of Emissions from Cement Kilns [NOx]	SCAQMD	1992	1995	IV-A
P-D-1	Control of Fugitive Emissions From Publicly Owned Treatment Works [ROG] ⁽²⁾	SCAQMD	1991	1995	IV-A
P-F-1	Phase-Out Stationary Source Fuel Oil and Solid Fossil Fuel Use [NOx, SOx, PM10]	SCAQMD	1991	1997	IV-A
P-F-2	Emission Minimization Management Plan [All Pollutants]	SCAQMD	1994	1999	IV-A
P-F-3	Marketable Permits Program [ROG, NOx]	SCAQMD	(3)	(3)	IV-A
A-A-1	Control of Emissions from Architectural Coatings [ROG] ⁽⁴⁾	SCAQMD	1993	1993	IV-B
A-A-2	Substitute Solvents Used for Clean-up of Surface Coating [ROG]	SCAQMD	1991	1993	IV-B
A-A-3	Control of Emissions from Domestic Products [ROG]	ARB/SCAQMD	1991	2000	IV-B
A-A-4	Control of Emissions from Solvent Waste [ROG]	SCAQMD	1991	1993	IV-B
A-B-1	Control of Emissions from Gasoline Transfer: Fall-Safe Phase-I Vapor Recovery Systems [ROG]	SCAQMD	1994	1996	IV-B

(1) New control measures are shaded.

(2) This control measure has been adopted as a rule.

(3) This program is an alternative for the AQMP control measures.

(4) The SCAQMD will require legal authority to implement this control measure.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
A-B-2	Control of Emissions from Gasoline Transfer: Improved Installation and Repair of Phase-II Vapor Recovery Systems [ROG]	SCAQMD	1991	1993	IV-B
A-B-3	Control of Emissions from Pleasure Boat Fueling Operations [ROG]	SCAQMD	1994	1997	IV-B
A-B-4	Control of Emissions from Organic Liquid Transfer [ROG]	SCAQMD	1994	1996	IV-B
A-B-5	Further Control of Emissions from Gasoline Dispensing Facilities [ROG]	SCAQMD	1992	1994	IV-B
A-B-6	Control of Emissions from Utility Engine Refueling Operations [ROG]	SCAQMD	1992	1994	IV-B
A-B-7	Control of Emissions from Over-Filling of Vehicle Fuel Tanks [ROG]	SCAQMD/ARB	1993	1996	IV-B
A-B-8	Control of Fugitive Methane Emissions from Natural Gas Transmission/Distribution Pipelines [CH ₄] ⁽²⁾	SCAQMD	1993	1995	IV-B
A-B-9	Control of Emissions from Active Draining of Liquid Products [ROG]	SCAQMD	1993	1995	IV-B

(1) New control measures are shaded.

(2) This measure is not subject to prioritization process.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
A-C-1	Control of Emissions from Large Commercial Bakeries [ROG] ⁽²⁾	SCAQMD	1991	1994	IV-B
A-C-2	Control of Emissions From Commercial Charbroiling [ROG, PM10]	SCAQMD	1991	1994	IV-B
A-C-3	Control of Emissions from Laboratory Fume Hoods [ROG]	SCAQMD	1994	1997	IV-B
A-C-4	Control of Emissions from Deep Fat Frying [ROG, PM10]	SCAQMD	1993	1997	IV-B
A-C-5	Control of Emissions from Miscellaneous Combustion Sources [NO _x]	SCAQMD	1993	1996	IV-B
A-C-6	Further Control of Emissions from Internal Combustion Engines [NO _x]	SCAQMD	1995	1998	IV-B
A-D-1	Out-of-Basin Transport of Biodegradable Solid Waste [All Pollutants]	SCAQMD/SCAG/ Sanitation Dist.	1993	1997	IV-B
A-D-2	Control of Emissions from Swimming Pool Water Heating [NO _x]	SCAQMD/ Local Gov't	1992	1999	IV-B
A-D-3	Control of Emissions from Residential & Commercial Water Heating [NO _x]	SCAQMD/ Local Gov't	1992	2006	IV-B
A-E-1	Control of Emissions from Pesticide Application [ROG]	SCAQMD/CDFA	1993	1996	IV-B

(1) New control measures are shaded.

(2) This control measure has been adopted as a rule.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
A-E-2	Control of Emissions from Livestock Waste (ROG, PM10, Ammonia)	SCAQMD	1992	1996	IV-B
A-F-1	Installation of Best Available Retrofit Control Technology on Miscellaneous Sources (All Pollutants)	SCAQMD	1992	1995	IV-B
A-F-2	Control of Emissions from Construction and Demolition Activities, and Onsite Vehicular Flow (PM10)	SCAQMD/ Local Gov't	1992	1994	IV-B
A-F-3	Control of Ammonia Emissions from Stationary Sources by Permits and Fees (Ammonia)	SCAQMD	1995	1998	IV-B
A-F-5	Control of Dust Emissions from Wind Erosion (PM10)	SCAQMD/ Local Gov't	1992	1997	IV-B
M-G-1	Zero-Emission Urban Bus Implementation (All Pollutants)	SCAQMD	1993	1994-2000	IV-C
M-G-2	Low Emission Retrofit of Transit Buses (NOx, SOx, PM10)	SCAQMD	1992	1994-1998	IV-C
M-G-3	Use of Radial Tires on Light Duty Motor Vehicles (PM10)	SCAQMD	1991	1993-1995	IV-C
M-G-4	Low-Emission New Fleet Vehicles (All Pollutants)	SCAQMD	1991	1993-2000	IV-C
M-G-5	Motor Vehicle Buyback Program (ROG, CO, NOx)	SCAQMD	1993	1993-1997	IV-C
M-G-6	Eliminate Excessive Car Dealership Cold Starts (ROG, CO, NOx)	SCAQMD/ Local Gov't	1994	1994	IV-C

(1) New control measures are shaded.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
M-G-7	Eliminate Excessive Curb Idling [ROG, CO]	SCAQMD/ Local Govt	1993	1994	IV-C
M-G-8	Aerodynamic Devices for Trucks [All Pollutants]	SCAQMD	1992	1993	IV-C
M-G-9	Eliminate Emissions from Advertising Vehicles [All Pollutants]	SCAQMD/ Local Govt	1994	1995	IV-C
M-G-10	Eliminate CFC Based Transport Refrigeration Systems [CFC]	SCAQMD	1992	1993-1996	IV-C
M-G-11	Inspection and Maintenance Program Enhancement [ROG, CO, NOx]	SCAQMD/ BAR	1993	1994	IV-C
M-H-1	Environmental Review Program [ROG, CO, NOx]	SCAQMD/ Local Govt	1991	1992	IV-C
M-H-2	Trip Reduction for Schools [ROG, CO, NOx]	SCAQMD/ Local Govt	1992	1993	V-C
M-H-4	Special Activity Centers [ROG, CO, NOx]	SCAQMD/ Local Govt	1993	1994	IV-C
M-H-5	Enhanced Regulation XV [ROG, CO, NOx, PM10]	SCAQMD/ Local Govt	1992	1993	IV-C

(1) New control measures are shaded.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
M-H-6	Truck Programs [ROG, CO, NO _x]	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-7	Registration Program	SCAQMD/ Local Gov't	1991	1992	IV-C
M-H-9	Sensitive Receptor Review [Toxic Air Contaminants]	SCAQMD	1991	1992	IV-C
M-I-1	Control of Emissions from Ship Berthing Facilities [NO _x]	SCAQMD/Ports of L.A. & L.B.	1993	1995-2010	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/ EPA/ARB/Ports of L.A. & L.B./ U.S. Coast Guard	1991	1994-1997	IV-C
M-I-4	Control of Emissions from Marine Diesel Operations [NO _x]	SCAQMD	1992	1993	IV-C
M-I-5	Limit Sulfur Content of Marine Fuel Oils [SO _x]	SCAQMD	1992	1994	IV-C
M-I-7	Eliminate Leaf Blowers [All Pollutants]	SCAQMD/ Local Gov't	1993	1994	IV-C
E-D-1a	Residential Sector - Electricity Savings [NO _x]	SCAQMD/CEC/ Local Gov't/PUC	1994	2007	IV-D

(1) New control measures are shaded.

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1a	Commercial Sector - Electricity Savings [NO _x]	SCAQMD/CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1994	2009	IV-D
E-C-2a	Industrial Sector - Electricity Savings [NO _x]	SCAQMD/CEC/ Local Gov't/PUC	1994	2006	IV-D
E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2009	IV-D
E-C-2c	Industrial Sector - Glass Recycling [NO _x]	SCAQMD/CEC/ Local Gov't	1991	1996	IV-D
E-C-2d	Industrial Sector - Paper Recycling [NO _x]	SCAQMD/CEC/ Local Gov't	1994	2001	IV-D
E-C-3	Local Government Sector - Electricity and Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2010	IV-D
1a	Person Work Trip Reduction [ROG, NO _x , CO]	Local Gov't/SCAG/ CTS/SCAQMD*	1994	1995	IV-E

(1) New control measures are shaded.

* District Backstop Rule, if necessary

TABLE 7-3 (Continued)⁽¹⁾
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
1b	Non-Motorized Transportation [ROG, NOx, CO]	Local Gov't/ SCAQMD*	1994	1995	IV-E
2a	Employer Rideshare and Transit Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD*/SCAQ/ CTS	1994	1995	IV-E
2b	Parking Management [ROG, NOx, CO]	Local Gov't/ SCAQMD*	1995	1996	IV-E
2d	Merchant Transportation Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD*	1995	1996	IV-E
2e	Auto Use Restrictions [ROG, NOx, CO]	Local Gov't/ SCAQMD*	1995	1996	IV-E
3a	Truck Dispatching, Rescheduling and Rerouting [ROG, NOx, CO]	Local Gov't/ SCAQMD*	1995	1996	IV-E
6	Aircraft and Ground Service Vehicles [ROG, NOx, CO]	SCAQMD/ Airlines/ Airport Operators	1992	1995	IV-E

(1) New control measures are shaded.

* District backstop rule, if necessary

TABLE 7-3 (Continued)
District - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
7	Centralized Ground Power Systems [ROG, NOx]	SCAQMD/ Airlines/ Airport Operators	1992	1995	IV-E
8	Airport Ground Access [ROG, NOx, CO]	SCAQMD/ Airport Operators/ Local Gov't	1992	1995	IV-E
10	General Aviation Vapor Recovery [ROG]	SCAQMD/ Airport Operators/	1992	1995	IV-E
12a	Paved Roads [PM10]	SCAQMD/ARB/ Local Gov't/ CALTRANS/Sanitation & Flood Districts	1992	1992	IV-E

SCAG/Local Governments

While SCAG is primarily responsible for preparing land use and transportation control measures for the AQMP, and for jointly preparing the energy conservation measures included in Appendix IV-D, it also provides information regarding conformity of regionally significant projects with the AQMP to local governments, and approving the Regional Transportation Improvement Program (RTIP).

SCAG is responsible for approving the annual RTIP and for determining its consistency with the Regional Mobility Plan (RMP) and the AQMP (the RMP is adopted with the AQMP and RMP measures are included in the AQMP). Non-conforming transportation projects are not included in the biennial element (years 1-2) of the RTIP. SCAG also reviews and provides conformity assessments of regional significant projects submitted through the Inter-governmental Review Clearinghouse. Local governments, based on such input, make the final conformity findings.

Local governments will be primarily responsible for reducing emissions in the areas of energy conservation, dust control, and trip reduction. Specifically, the AQMP requires local governments to implement new regulatory ordinances, administer changes to the project review process, assist with enforcement and data collection for monitoring effectiveness, forge new partnerships with other governmental agencies to develop energy conservation standards, and seek administrative changes in the way they operate.

If local governments choose to, they can also implement the indirect source control measures at the local level as previously discussed. The regional rules will be structured to provide local governments with this option, as well as training to adequately implement the programs.

SCAG has also proposed control measures to be implemented by transportation commissions and local governments. Transportation commissions will be responsible for programming air quality-related transportation improvements in their County Transportation Improvement Program, such as high-occupancy vehicle lanes and transit projects.

The District supports and encourages local government implementation of the transportation control measures at the local level. In order for local governments to successfully achieve the emission reductions called for in the AQMP, the District is committed to providing local governments with the necessary technical assistance. In the area of technical assistance, the District will develop model ordinances in consultation with SCAG, local governments, and the county transportation commissions to implement control measures 1a, 1b, 2a, and 2e (and measures 2b, 2d, and 3a as needed). The ordinances will be structured to achieve real enforceable emission reductions and emission reductions beyond those gained from similar District rules. The model ordinances will be linked to both the indirect source program and the congestion management program (CMP). The District will work with the four county transportation commissions so that the ordinances address the requirements of the CMP so that to the extent possible local governments can take one action to implement both the AQMP and CMP.

Local governments adopting the District's model ordinance, or a modified version (e.g., ordinance, enforceable plans or programs), as long as the District finds that these ordinances achieve at least the same emission reductions as the model, would be considered to have implemented their portion of the Plan. If the evaluation demonstrates compliance by all counties and substantial compliance by the other local governments sufficient to achieve the emission reductions established for the measure, then the District will not need to adopt a regional rule. If there is a shortfall, the District will adopt a regional rule that would permit those local governments that have already adopted approved ordinances to be exempt from the rule. The District's evaluation of substantial compliance will be based on a determination that the actions of local governments will achieve the emissions reductions targeted for each measure.

The description of the control approach in each of these measures is intended to represent a general control strategy to achieve the emission reduction targets and not to predetermine the specific terms of backstop rules to be developed through the District's rule-making process.

The implementation schedule for these measures is as follows:

Action	Agency	Date
Development of Model Ordinances	District	January, 1992 (1a, 1b, & 2a)
		January, 1993 (2e)*
Adoption of Local Ordinances	Local Government	December 31, 1992 (1a, 1b, 2a, 2b, 2d & 3a)
		December 31, 1993 (2e)
Assess Local Ordinances	District	January, 1993 (1a, 1b, & 2a)
		January, 1994 (2b, 2d, 2e, & 3a)
Adoption of Backstop Rules	District	January, 1994 (1a, 1b & 2a)
		January, 1995 (2b, 2d, 2e, & 3a)

* Additional Guidance will be prepared as needed for other control measures.

Table 7-4 identifies the control measures that local governments will be implementing under the 1991 AQMP. For the SCAG-generated Tier I control measures, the proposed date for full implementation is generally 2010. The adoption dates and the first milestone for phased implementation are also provided in Table 7-4.

TABLE 7-4⁽¹⁾
Local Governments - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
A-D-2	Control of Emissions from Swimming Pool Water Heating [NOx]	SCAQMD/ Local Gov't	1992	1999	IV-B
A-D-3	Control of Emissions from Residential & Commercial Water Heating [NOx]	SCAQMD/ Local Gov't	1992	2006	IV-B
A-E-3	Control of Dust Emissions from Agricultural Tilling [PM10]	Local Gov't	1994	1996	IV-B
A-F-2	Control of Emissions from Construction and Demolition Activities and Onsite Vehicular Flow [PM10]	SCAQMD/ Local Gov't	1992	1994	IV-B
A-F-4	Low Emission Methods and Materials for Building Construction [ROG, PM10]	Local Gov't	1994	1996	IV-B
A-F-5	Control of Dust Emissions from Wind Erosion [PM10]	SCAQMD/ Local Gov't	1992	1997	IV-B
M-G-6	Eliminate Excessive Car Dealership Cold Starts [ROG, CO, NOx]	SCAQMD/ Local Gov't	1994	1994	IV-C
M-G-7	Eliminate Excessive Curb Idling [ROG, CO]	SCAQMD/ Local Gov't	1993	1994	IV-C
M-G-9	Eliminate Emissions from Advertising Vehicles [All Pollutants]	SCAQMD/ Local Gov't	1994	1995	IV-C
M-H-1	Environmental Review Program [ROG, NOx, CO] ⁽²⁾	SCAQMD/ Local Gov't	1991	1992	IV-C

(1) New control measures are shaded.

(2) District's Indirect Source Control Measure

TABLE 7-4 (Continued)⁽¹⁾
Local Governments - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
M-H-2	Trip Reduction for Schools [ROG, NOx, CO] ⁽²⁾	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-3	Supplement Development Standards [ROG, NOx, CO] ⁽²⁾	Local Gov't	1993	1993	IV-C
M-H-4	Special Activity Centers [ROG, NOx, CO] ⁽²⁾	SCAQMD/ Local Gov't	1993	1994	IV-C
M-H-5	Enhanced Regulation XV [ROG, NOx, CO] ⁽²⁾	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-6	Truck Programs [ROG, NOx, CO] ⁽²⁾	SCAQMD/ Local Gov't	1992	1993	IV-C
M-H-7	Registration Program ⁽²⁾	SCAQMD/ Local Gov't	1991	1992	IV-C
M-I-1	Control of Emissions from Ship Berthing Facilities [NOx]	SCAQMD/Ports of L.A. & L.B.	1993	1995-2010	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	SCAQMD/EPA/ ARB/Ports of L.A. & L.B./U.S. Coast Guard	1991	1994-1997	IV-C
M-I-7	Eliminate Leaf Blowers [All Pollutants]	SCAQMD/ Local Gov't	1993	1994	IV-C

(1) New control measures are shaded.

(2) District's Indirect Source Control Measure

TABLE 7-4 (continued)⁽¹⁾
Local Governments - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
1a	Person Work Trip Reduction [ROG, NOx, CO]	Local Gov't/SCAG/ CTS/SCAQMD	12/92	2000	IV-E
1b	Non-Motorized Transportation [ROG, NOx, CO]	Local Gov't/ SGAG/SCAQMD	12/92	2000	IV-E
2a	Employer Rideshare and Transit Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CTS	12/92	1994	IV-E
2b	Parking Management [ROG, NOx, CO]	Local Gov't/ SCAQMD	12/92	1994	IV-E
2d	Merchant Transportation Incentives [ROG, NOx, CO]	Local Gov't/ SCAQMD	12/92	1994	IV-E
2e	Auto Use Restrictions [ROG, NOx, CO]	Local Gov't/ SCAQMD	12/92	1994	IV-E
2f	HOV Facilities [ROG, NOx, CO]	CALTRANS/ CTC/Local Gov't	(2)	(2)	IV-E
2g	Transit Improvements [ROG, NOx, CO]	CTC/UMTA/ CALTRANS/ Local Gov't/ Public Transit Providers	(2)	(2)	IV-E

(1) New control measures are shaded.

(2) To be determined by the implementing agencies.

TABLE 7-4 (Continued)
Local Governments - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
3a	Truck Dispatching, Rescheduling and Rerouting [ROG, NOx, CO]	Local Gov't/ SCAQMD/SCAG/ CALTRANS/CHP	12/92	1994	IV-E
3b	Diverging Port-Related Truck Traffic to Rail [ROG, NOx, CO]	Ports of L.A. & L.B./ Railroads	1989-1992	1994	IV-E
4	Traffic Flow Improvements [ROG, NOx, CO]	CALTRANS/ Local Gov't/ CTC/SCAG	1989-2000	1991	IV-E
5	Nonrecurrent Congestion [ROG, NOx, CO]	CALTRANS/CHP/ SCAG/SCAQMD/ CTC/Local Gov't	1990-1994	1994	IV-E
9	Replacement of High Emitting Aircraft [All Pollutants]	L.A. Dept of Airports/FAA	12/91	1994	IV-E
11	Rail Consolidation to Reduce Grade Crossings [ROG, NOx, CO]	CALTRANS/ Alameda Corridor Transp. Authority	1992	1997	IV-E
12a	Paved Roads [PM10]	SCAQMD/ARB/ Local Gov't/ CLATrans/Sanitation & Flood Districts	12/92	1994	IV-E

TABLE 7-4 (Continued)
Local Governments - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
12b	Unpaved Roads [PM10]	ARB/CALTRANS/ Local Gov't	12/93	1994	IV-E
13	Freeway & Highway Capacity Enhancements [ROG, NOx, CO]	CALTRANS/ SCAG/CTC/FHWA DMV/BAR	(1)	(1)	IV-E
16	High Speed Rail [ROG, NOx]	SCAG/ Local Gov't/ CALTRANS	12/91	1997	IV-E
17	Growth Management [ROG, NOx, CO] ⁽²⁾	SCAG/ Local Gov't	12/92, 12/94	1997	IV-E
E-D-1a	Residential Sector - Electricity Savings [NOx]	SCAQMD/CEC/ Local Gov't/PUC	1994	2007	IV-D
E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1993	2006	IV-D
E-C-1a	Commercial Sector - Electricity Savings [NOx]	SCAQMD/CEC/ Local Gov't/PUC	1993	2008	IV-D
E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1994	2009	IV-D

(1) To be determined by the implementing agencies.

(2) VMT targets are included as an implementation option to the job/housing ratio for this control measure.

TABLE 7-4 (Continued)⁽¹⁾
Local Governments - Tier I Control Measures

AQMP Measure No.	Title	Implementing Agency	Proposed Adoption Date	Proposed Implementation Date	AQMP Appendix No.
E-C-2a	Industrial Sector - Electricity Savings [NO _x]	SCAQMD/CEC/ Local Gov't/PUC	1994	2008	IV-D
E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2009	IV-D
E-C-2c	Industrial Sector - Glass Recycling [NO _x]	SCAQMD/CEC/ Local Gov't	1991	1998	IV-D
E-C-2d	Industrial Sector - Paper Recycling [NO _x]	SCAQMD/CEC/ Local Gov't	1994	2001	IV-D
E-C-3	Local Government Sector - Electricity and Natural Gas Savings [All Pollutants]	SCAQMD/CEC/ Local Gov't/PUC	1995	2010	IV-D

(1) New control measures are shaded.

Adoption Schedule For Tier I Control Measures

All of the subject control measures included in Tier I can be adopted over the next several years with nearly all measures achieving full implementation by the year 2000. It should be noted that significant institutional commitments and changes will likely be needed to implement many of the measures, particularly those that affect transportation systems and land use. Tier I control measures can be implemented by existing agencies, in most cases with existing authority. Additional authority and resources will be needed to develop and implement some system-wide measures to reduce emissions from transportation sources (non-tail pipe measures).

The Tier I control measures that have been prioritized by the methodology discussed in Chapter 6 of this document are presented in Table 7-5. These control measures are listed in terms of priority from highest to lowest. The implementation schedule for these control measures will be further assessed during the public review process.

Among Tier I control measures, the District Board approved several Early Action Plan measures which are listed in Table 7-6. In addition, a significant number of the Tier I control measures were carried over from the 1989 AQMP Revision. A portion of these measures are currently subject to the District's rulemaking schedule (See Table 7-7). Because these two groups of control measures are already in the rulemaking process they were not integrated into the prioritization process.

Two stationary source control measures (A-B-8 and A-F-3) were not subject to the prioritization process because they are directed at noncriteria pollutants. A third control measure "Marketable Permit Program" was also not subject to the prioritization process because it is considered an alternative implementation technique for the other identified control measures.

TABLE 7-5
District Control Measures
Ranked According To Adoption Priority

Priority	Control Measure No.	AQMP Title	Appendix No.
1	M-G-12	Oxygenated Fuels Program [CO]	IV-C
2	A-F-5	Control of Dust Emissions from Wind Erosion [PM10]	IV-B
3	A-F-2	Control of Emissions from Construction, Demolition, and Onsite Vehicular Flow [PM10]	IV-B
4	A-A-3	Control of Emissions from Domestic Products [ROG] ¹	IV-B
5	A-E-2	Control of Emissions from Livestock Waste [ROG, PM10, NH ₃]	IV-B
6	M-I-5	Limit Sulfur Content of Marine Fuel Oils [SO _x]	IV-C
7	M-I-8	Emission Standards for Construction and Farm Equipment (175 Hp and less) [ROG, NO _x , PM10]	IV-C
8	M-G-10	Eliminate CFC-Based Transport Refrigeration Systems [All Pollutants, CFCs]	IV-C
9	A-B-6	Control of Emissions from Utility Engine Refueling Operations [ROG]	IV-B
10	M-I-2	Control of Emissions from Jet Aircraft [ROG, NO _x , CO] ²	IV-C
11	P-B-5	Control of Emissions from OCS Exploration, Development, and Production [All Pollutants]	IV-A
12	M-G-8	Aerodynamic Device for Trucks [ROG, NO _x , CO, PM10]	IV-C
13	A-F-1	Installation of BARCT on Miscellaneous Sources [All Pollutants]	IV-B
14	P-C-8	Further Emission Reductions from Cement Kilns [NO _x]	IV-A
15	A-B-5	Further Control of Emissions from Gasoline Dispensing Facilities [ROG]	IV-B
16	M-G-2	Low Emission Retrofit of Transit Buses [NO _x , PM10, SO _x]	IV-C
17	M-I-4	Control of Emissions from Marine Diesel Operations [NO _x]	IV-C
18	M-H-3	Supplemental Development Standards [ROG, NO _x , CO]	IV-C
19	P-C-3	Control of Emissions from Woodworking Operations [PM10]	IV-A
20	M-G-11	Inspection and Maintenance Program Enhancements [ROG, CO, NO _x] ³	IV-C
21	E-D-1b	Residential Sector - Natural Gas Savings [All Pollutants] ²	IV-D
22	A-C-5	Control of Emissions from Miscellaneous Combustion Sources [NO _x] ²	IV-A
23	P-B-7	Further Control of Emissions from Bulk Terminals [ROG]	IV-A
24	M-I-7	Eliminate Leaf Blowers [ROG, NO _x , CO, PM10]	IV-C
25	A-C-4	Control of Emissions from Deep Fat Frying [ROG, PM10] ⁴	IV-B

TABLE 7-5
(Continued)
District Control Measures
Ranked According To Adoption Priority

Priority	Control Measure No.	AQMP Title	Appendix No.
26	M-H-4	Special Activity Centers [ROG,NO _x ,CO] ⁴	IV-C
27	P-A-5	Further Emission Reductions from Perchloroethylene Dry Cleaning Operations [ROG]	IV-A
28	A-B-9	Control of Emissions from Active Draining of Liquid Products [ROG]	IV-B
29	E-C-1a	Commercial Sector - Electricity Savings [NO _x] ^{2,5}	IV-D
30	A-E-1	Control of Emissions from Pesticide Application [ROG]	IV-B
31	M-I-1	Control of Emissions from Ship Berthing Facilities [NO _x]	IV-C
32	A-D-1	Out-of-Basin Transport of Biodegradable Solid Waste [All Pollutants] ^{2,6}	IV-B
33	A-A-1	Control of Emissions from Architectural Coatings [ROG] ^{2,7}	IV-B
34	M-G-1	Zero-Emission Urban Bus Implementation [ROG,NO _x ,CO,PM10]	IV-C
35	M-G-7	Eliminate Excessive Curb Idling [ROG, CO] ⁸	IV-C
36	M-G-5	Motor Vehicle Buyback Program [ROG, CO, NO _x]	IV-C
37	A-B-7	Fuel Shutoff Mechanism to Prevent Topping Off [ROG] ²	IV-B
38	M-I-6	Low Emissions from Military Aircraft [ROG, NO _x , CO] ²	IV-C
39	E-D-1a	Residential Sector - Electricity [NO _x] ^{2,5}	IV-D
40	M-G-6	Eliminate Excessive Car Dealership Coldstarts [ROG, NO _x , CO] ⁸	IV-C
41	P-B-2	Control of Emissions from Petroleum FCC Units [NO _x] ²	IV-A
42	P-C-7	Further Emission Reductions from Glass Melting Furnaces [NO _x]	IV-A
43	A-B-1	Control of Emissions from Gasoline Transfer, Phase-I [ROG] ²	IV-B
44	A-B-3	Control of Emissions from Pleasure Boat Fueling Operations [ROG]	IV-B
45	P-C-6	Control of Emissions from Curing and Drying Ovens [NO _x]	IV-A
46	P-B-3	Control of Emissions from Gas Fired Petroleum Refinery Process Heaters [PM10]	IV-A
47	M-G-9	Eliminate Emissions from Advertising Vehicles [All Pollutants] ³	IV-C
48	P-C-5	Control of Emissions from Metal Melting Furnaces [NO _x]	IV-A
49	E-C-1b	Commercial Sector - Natural Gas Savings [All Pollutants] ²	IV-D
50	A-E-3	Control of Dust Emissions from Agricultural Tilling [PM10]	IV-B

TABLE 7-5
(Continued)
District Control Measures
Ranked According To Adoption Priority

Priority	Control Measure No.	AQMP Title	Appendix No.
51	A-B-4	Control of Emissions from Organic Liquid Transfer [ROG] ²	IV-B
52	E-C-2d	Industrial Sector - Paper Recycling [NO _x]	IV-D
53	E-C-2a	Industrial Sector - Electricity Savings [NO _x] ^{2,5}	IV-D
54	P-A-2	Further Emission Reductions from Automobile Assembly Coating [ROG]	IV-A
55	P-A-6	Control of Emissions from Electronic Components Manufacturing [ROG] ^{2,3}	IV-A
56	A-C-3	Control of Emissions from Laboratory Fume Hoods [ROG] ^{2,3}	IV-B
57	P-B-6	Control of Emissions from Petroleum Refinery Flares [All Pollutants] ^{2,3}	IV-A
58	A-F-4	Low Emission Methods and Materials for Building Construction [ROG, PM10] ^{2,3}	IV-B
59	P-F-2	Emission Minimization Management Plan [All Pollutants] ^{2,3}	IV-A
60	E-C-2b	Industrial Sector - Natural Gas Savings [All Pollutants] ^{2,3}	IV-D
61	E-C-3	Local Government Conservation [All Pollutants] ^{2,3}	IV-D
62	A-C-6	Further Control of Emissions from Internal Combustion Engines [NO _x] ^{2,3}	IV-B

1 Cost-effectiveness based median value for ARB's Domestic Products Rule.

2 Cost-effectiveness based on average for type of source and pollutant.

3 Emission reductions based on conservative estimate.

4 Cost-effectiveness based on conservative estimate.

5 Emission reductions scaled based on energy savings.

6 Emission reductions about 50% of the inventory.

7 Emission reductions about 10% of the inventory.

8 Cost-effectiveness savings based on reduced fuel consumption.

TABLE 7-6

Early Action District Control Measures

Control Measure No.	AQMP Title	Appendix No.
M-H-1	Environmental Review Program [ROG, NO _x , CO]	IV-C
M-H-2	Trip Reduction for Schools [ROG, NO _x , CO]	IV-C
M-H-5	Enhanced Regulation XV [ROG, NO _x , CO, PM10]	IV-C
M-H-6	Truck Programs [ROG]	IV-C
M-H-7	Registration Program	IV-C
M-H-9	Sensitive Receptor Certification Process [Toxics]	IV-C

TABLE 7-7

Control Measures Currently On District
Rulemaking Calendar
Under The 1989 AQMP

Control Measure No.	AQMP Title	Appendix No.
A-A-2	Substitute Solvents Used for Clean-up of Surface Coating [ROG]	IV-B
A-A-4	Control of Emissions from Solvent Waste [ROG]	IV-B
A-B-2	Control of Emissions from Gasoline Transfer: Improved Installation and Repair of Phase II Vapor Recover Systems [ROG]	IV-B
A-C-1 ⁽¹⁾	Control of Emissions from Large Commercial Bakeries [ROG]	IV-B
A-C-2	Control of Emissions from Commercial Charbroiling [ROG, PM10]	IV-B
A-D-2	Control of Emissions from Swimming Pool Water Heating [NO _x]	IV-B
A-D-3	Control of Emissions from Residential and Commercial Water Heating [NO _x]	IV-B
E-C-2c	Industrial Sector - Glass Recycling [NO _x]	IV-D
M-G-3 ⁽²⁾	Use of Radial Tires of Motor Vehicles [PM10]	IV-C
M-G-4	Low Emission New Fleet Vehicles [All Pollutants]	IV-C
M-I-3	Control of Emissions from Marine Vessel Tanks [ROG]	IV-C
P-A-1 ⁽¹⁾	Further Emission Reductions from Wood Flatstock Coating [ROG]	IV-A
P-A-3	Further Emission Reductions from Paper, Fabric, and Film Coating [ROG]	IV-A
P-A-4 ⁽¹⁾	Further Emission Reductions from Metal Cleaning and Degreasing [ROG]	IV-A
P-B-1	Control of Emissions from Petroleum Refinery Fluid Catalytic Cracking (FCC) Units [NO _x]	IV-A
P-B-4	Improved Control of Emissions from Petroleum FCC Units [PM10]	IV-A
P-C-1	Further Emission Reductions from Rubber Products Manufacturing [ROG, PM10]	IV-A
P-C-2	Control of Emissions from Afterburners [NO _x]	IV-A
P-C-4	Control of Emissions from Small Boilers and Process Heaters [NO _x]	IV-A
P-D-1 ⁽¹⁾	Control of Emissions from Publicly Owned Treatment Works [ROG]	IV-A
P-F-1	Phase-Out Stationary Sources Fuel Oil and Solid Fossil Fuel Use [ROG]	IV-A
10	General Aviation Vapor Recovery [ROG]	IV-E
12a	Paved Roads [PM10] (Outdoor Storage of Particulate Matter)	IV-E

⁽¹⁾ This control measure has been adopted as a rule.

⁽²⁾ The adoption date for this control measure has been delayed until 1994 based on the District Board Action.

TIER II IMPLEMENTATION

The proposed Tier II control strategy, as discussed in Chapter 4, is composed mostly of extensions or more stringent applications of Tier I control measures. Immediate research and development activities are needed in the areas of solvent reformulation and non-polluting power generation and energy storage. In other cases, strong enforceable public and private commitments for the required implementation actions are needed. The agencies responsible for ensuring that research and development of Tier II measures occurs during the specified period are listed in Table 7-8. Demonstration projects for Tier II measures are listed in Table 7-9.

Meanwhile, regulatory intervention such as technology-forcing standards or emission charges and growth management measures will also be developed to bring about the technological advancement necessary to achieve Tier II goals. Table 7-10 shows the agencies responsible for seeking these changes.

To attain the Tier II reduction targets, numerous agencies in addition to the District will need to develop and follow demanding implementation schedules. These agencies may need to seek additional legal authority and resources to carry out these activities for which they will be responsible. They will also need to report their progress to other interested parties. The District will implement all measures related to stationary sources.

TABLE 7-8
Technology Advancement Projects

Subject	Agency	Expected Duration
Reformulation Of Solvents & Coatings	District	1988-2000
Alternative Solvent Application Methods (e.g., Robotic, UV)	District	1988-2000
Nonrecurrent Congestion Relief	SCAG	1988-1989
Export Fees	District	1988-1995
Emissions From Refinery Flares	District	1990-1992
Industrial Electrification Projects	District	1990-2000
Electric Vehicles (e.g., Battery powered, Fuel cell-powered)	District/CEC/ ARB/Utility	1988-2005
Alternative Fueled Vehicles in Light-, Medium-, and Heavy-Duty Vehicles	District/ARB	1988-1998
BARCT for Medium to Small Stationary Sources	District	1990-2000
Electrical Energy Supply and Distribution	District/CEC/Utility	1989-1998
Alternative Fuels in Refinery Heaters	District	1989-1995
Fuel Cells (> 100 MW)	District	1989-2000
Electric Vehicle Battery	District/CEC	1989-1995
PM10 Fugitive Emission Controls	District	1990-1995
Phase-I Vapor Recovery Systems	District/ARB	1990-1992
Economic and Environmental Impacts of Source Substitution	District	1990-1992
Railroad Electrification Feasibility Study	District/SCAG	1991-1992
Solar Engine Systems	District	1990-2000
Low-NOx Combustion for Residential, Commercial, and Industrial Applications	District	1990-1997
Low-Emitting Off-Road Vehicles	District/ARB	1990-1995

TABLE 7-9
Demonstration Projects

Project	Responsible Agency	Date
Electric Vehicles	District/CEC/ ARB/Utility	1988-1998
Alternative Fuels in Light-, Medium-, and Heavy-Duty Vehicles	District/ARB	1988-1998
Alternative Fuels in Refinery Heaters	District	1990-1995
Highway Electrification and Automation	District/Caltrans	1990-1998
Fuel Cells (11 MW)	District	1990-2000
Robotic Coating Operations	District	1990-1995
Phase-I Vapor Recovery System	District/ARB	1991-1992
Building Materials/Methods Study	District	1991-1992
Solar Engine Systems	District	1990-2000
Low-NO _x Combustion for Residential, Commercial, and Industrial Applications	District	1990-1997

TABLE 7-10
Enforceable Commitments/Legislative Needs

Subject	Agency	Secured By
Funding For Transportation Infrastructure	Caltrans/SCAG/ CTCS	1991-2000
Emission Charges	District/ARB	1995
Export Fees	District	1995
Growth Management	SCAG	1994

TIER III IMPLEMENTATION

Achievement of Tier III goals depends on substantial technological advancements and breakthroughs that are expected to occur throughout the next two decades. This requires an aggressive expansion of Tier II research and development efforts. After achieving Tier II targets, Tier III measures must be implemented on an accelerated schedule to achieve attainment as early as feasible. Tier III goals proposed are the same as the ones proposed in the 1989 AQMP except for on-road motor vehicles. The on-road proposals for 1991 AQMP are all included in Tier I.

Specifically, the 1989 Plan called for extremely low emitting vehicles. The 1991 AQMP proposes to achieve approximately the same level of emission reductions through the application of Tier I measures.

The District, in conjunction with federal, state, local, and regional agencies, will be responsible for ensuring that Tier III strategies are implemented, and that the emission reduction goals are met. These agencies will need to develop annual work plans and document their progress.

IMPLEMENTATION SUPPORT ACTIVITIES

District Assistance and Outreach Programs

Interagency Assistance

Since the adoption of the 1989 AQMP, the District has focused on developing outreach programs and technical assistance documents to facilitate the interagency partnership that is needed to implement the AQMP. The District intends to strengthen and further augment these programs to ensure that every effort is made to implement the 1991 AQMP successfully.

An important ongoing outreach program, recently established (November 1989) at the District is the Interagency AQMP Implementation Committee (IAIC). The IAIC provides ongoing coordination between key local government entities and the District Board as the AQMP is implemented. The IAIC is composed of 24 members representing local governments,

transportation agencies, water districts, and sanitation districts. Specifically, the IAIC is charged with:

- o Identifying how local governments throughout the region should interact with the District to ensure implementation of the AQMP.
- o Assisting the District in developing additional transportation and indirect source control measures.
- o Identifying and resolving issues that could affect timely implementation of the AQMP.
- o Assisting the District in developing and carrying out its local government outreach program to ensure that local government's information, technical, and policy input needs are met.
- o Reviewing and recommending appropriate revisions in the timing of AQMP implementation.
- o Developing a unified Southern California position on state and federal air quality issues including, but not limited to, how much funding support is needed to enable local governments to carry out AQMP implementation responsibilities and determine the best sources of that funding.
- o Determining how local governments should be involved in the AQMP implementation update process.
- o Developing a structure for identifying, analyzing, and resolving potential conflicts between air quality and other regional goals.

The IAIC also established a Technical Advisory Committee (TAC) which provides technical input on AQMP programs and policies, and suggests issues relating to AQMP implementation for the IAIC to discuss.

Through the IAIC and TAC, the District will be able to facilitate and coordinate the implementation efforts of the local agencies in the Basin.

As part of the implementation program for the 1991 AQMP, the District will further its local government outreach programs by holding planning forums

for local planning directors. This will provide another means for local governments to obtain information and technical assistance on implementing the AQMP, as well as an opportunity for local governments to have technical input into the development of rules that affect local jurisdictions. Additional technical support in the form of model ordinances and other appropriate implementation guidelines will be developed by the District to assist local governments in implementing the regional rules at the local level, as well as, other local ordinances.

Assistance to Small Businesses

The District has recently expanded its program to assist small businesses in complying with District rules and regulations pursuant to AB 2444 and AB 3898. In June 1990, the District Governing Board appropriated one million dollars to provide technical and financial assistance to small businesses through business environmental assistance centers that will be established throughout the Basin. As required by AB 2444, the District's Public Advisor's Office, in cooperation with the California Community College System, and with the assistance of the California Pollution Control Finance Authority, is establishing the first of these centers which will provide small businesses with technical assistance in the areas of:

- o Compliance Counseling;
- o Loan Guarantee Packaging;
- o Environmental Audits; and,
- o Applied Technology and Education.

SCAG Assistance and Outreach Programs

Interagency Assistance

Since the adoption of the 1989 AQMP, SCAG has focused on facilitating local implementation of the land use, transportation, and energy conservation measures as specified in Appendix IV-G. Specific documents published and distributed are Guidance for Local Government Implementation of Regional Plans, Guidelines for the Development of Local Air Quality Elements and Guidance for Implementation of 1989 AQMP Conformity Procedures.

These and other products were developed in a consensus-building process involving participation by a broad range of public, private, environmental and elected officials. The Growth Management and Transportation Task Force provided general policy development and guidance on future AQMP changes. Conformity procedures were developed through the Conformity Working Group and three Subgroups. Consensus on land use and general development was achieved through SCAG's Planning Directors Committee.

Workshops and Local Meetings

In addition to task forces and working groups created by SCAG, SCAG staff members have participated in a number of workshops co-sponsored by the District and SCAG. SCAG also participated in regularly scheduled local government meetings including Orange County City County Coordinating Committee meetings, Orange County Air Implementation Subcommittee meetings, San Bernardino County/Cities Regional Air Quality Plan.

Funding For Implementation

Since the 1989 AQMP was adopted, the state legislature passed AB 2766 which will provide for an additional motor vehicle registration fee to fund the implementation of the air quality management plan and provisions of the CCAA relating to mobile sources of emissions. This legislation will provide needed funds to local governments to implement those portions of the AQMP for which they are responsible, as well as provide a more equitable distribution of the costs of implementing the AQMP among stationary and mobile sources.

Within the District, the funds collected through the motor vehicle registration fee will be distributed as follows:

- o Thirty percent is to be used by the District for programs to reduce air pollution from motor vehicles and to carry out related planning, monitoring, enforcement, and technical studies which are needed to implement the CCAA or the AQMP.

- o Forty percent is to be distributed, based on population, to cities and counties, to be used in implementing programs to reduce air pollution from motor vehicles, pursuant to the CCAA or revised AQMP.
- o Thirty percent is to be placed in an account to be used to implement or monitor programs to reduce air pollution from mobile vehicles pursuant to the CCAA or revised AQMP. A regional mobile source air pollution reduction review committee will develop and adopt work programs to be funded by this account, subject to review by the District Board.

CONGESTION MANAGEMENT PROGRAM LINKAGE WITH THE AQMP

In 1989, legislation was adopted that requires either county transportation commissions or another designated public agency to adopt a Congestion Management Program (CMP) by December 1, 1991. There are several linkages between the CMP and AQMP.

District's Role

The District has a prescribed role in the development and implementation of the CMP. CMP legislation requires that the CMP be developed "in consultation with, and with the cooperation of," the local air quality management district. The District is also required to "establish and periodically revise a list of approved improvements, programs, and actions that a city or county can incorporate into the deficiency plans. Finally, the law requires that the CMP-designated agency consult with the District before excluding the impacts of traffic generated by low and very low income housing, freeway ramp metering, etc. from the analysis to determine consistency with the level of service (LOS) standards.

All of the elements of the CMP should be consistent with the AQMP. In particular, the CMP should be consistent with the growth forecast used in the AQMP and should include at minimum the following transportation control measures from the AQMP:

- o CM-H-04 Special Activity Centers;
- o CM-H-06 Truck Program;
- o CM-H-03 Supplemental Development Standards;
- o CM-H-05 Enhanced Regulation XV;
- o CM-2.b. Parking Management;
- o CM-2.g. Transit Improvements;

- o CM-4 Traffic Flow Improvements; and,
- o CM-2.f. High Occupancy Vehicle Lanes.

For several of these measures, the District will adopt a regional rule with a future effective compliance date. Prior to the compliance date, local governments can be certified to implement the program at the local level. Local governments that are certified to implement the control measures can take credit for the trip reductions and corresponding improvements in the appropriate roadway and intersection LOS in the CMP. Control measures that are implemented by the District can not be used to satisfy CMP requirements.

The deficiency plans should be in excess of the transportation control measures in the AQMP. The District is consulting with the County Transportation Commissions, local governments, and SCAG to establish the definition of the list of deficiency plan elements.

Local governments can submit to the District other control strategies that are not in the AQMP for the District's approval as deficiency measures.

The integration of the AQMP control measures into the CMP is important for a variety of reasons. It will ensure that the strategies used for relieving congestion are also beneficial to air quality. It will allow local governments to implement two programs (CMP and AQMP) through one set of actions. Finally, there is a fiscal benefit to local governments. Since CMPs are integrated into the Regional Transportation Program, these control measures become eligible for state transportation funds (including the revenues generated from the gas taxes).

SCAG's Role in the CMP

SCAG's role in the CMP process is to determine that all programs are consistent with the adopted Regional Mobility Plan, and that the programs of the various counties are compatible with one another. SCAG must also ensure consistency among its data bases and modeling procedures and those used by the jurisdictions to evaluate the impact of land-use decisions on the regional transportation system. Combined with stringent CMP monitoring procedures and sanctions for non-compliance, the net result is to require the

county commissions and local governments to implement major components of the regional plans, including the GMP and the AQMP, both of which are included within the RMP. SCAG also interacts with the technical committees of the congestion management agencies, and provides assistance in evaluating plan components.

CEQA REVIEW PROCESS LINKAGE WITH THE AQMP

The air quality impacts of projects proposed throughout the region have the potential to hinder the progress toward attainment. Through the California Environmental Quality Act (CEQA) process these potential impacts can be mitigated utilizing some of the control measures in the AQMP. Additionally, the environmental review process can identify if regional growth is consistent with the GMP. Mitigation can be applied, to greatest extent feasible, to accommodate growth within the region while at the same time making progress toward attainment.

Recently the District established a formal process to provide support to local governments through the CEQA process by commenting on the adequacy of the air quality analysis performed as part of an environmental document. Through CEQA a proposed project must identify all adverse environmental impacts that may result from the project. Those impacts seen as significant are required to be mitigated to greatest extent feasible.

Through commenting and the suggestion of mitigation measures the District has the opportunity to apply some of the control strategies in the AQMP earlier than anticipated, on a project-by-project basis. This is particularly important when considering the magnitude of projects, and rate of growth within the District. For example, the Ports of Los Angeles and Long Beach are currently preparing environmental documentation for a project which, if approved, could triple the size of the current Ports. Through the CEQA commenting process, and local government support, air quality impacts will be lessened by the application of control strategies.

The District's support role will be expanded through redesign and use of the Air Quality Handbook for preparing Environmental Impact Reports. The Handbook is designed to be a user-friendly document that can be easily utilized by consultants and local government planners to prepare and

evaluate the adequacy of environmental documentation relative to air quality. Workshops and training will be available on the use of the Handbook.

Additionally, the District staff is available for early consultation and review of proposed developments which have the potential to generate significant emissions. Early consultation can result in significant savings through identification and mitigation of potentially significant emission sources at the front end of project development when changes can be easily accommodated.

Environmental review, early consultation and local government assistance will play an important role in the region's progress toward attainment.

MONITORING THE AQMP

The 1991 AQMP sets the course for attaining the federal and state air quality standards in the Basin. As the Plan is implemented, it is essential to periodically assess the effectiveness of the air pollution control programs in reducing emissions, and determine whether or not the Basin is still proceeding along the course set forth in the AQMP. Monitoring the AQMP's effectiveness will also be an integral part of preparing the annual rule work plan, as the monitoring report will provide the necessary information to reprioritize measures to achieve the five percent per year or fifteen percent over three years reductions required by the CCAA.

It is equally important that the people who live and work in the Basin be kept informed of the efforts being undertaken to make the air quality better, and to what extent the air quality is improving as a result. The monitoring report can provide this kind of feedback to the Basin's residents.

Monitoring the effectiveness of the AQMP is required by the CCAA (Health and Safety Code Sections 40924) and federal Clean Air Act (Part D, Section 172). Specifically, the CCAA requires that the District prepare and submit a report each year to the ARB summarizing the Basin's progress in meeting the schedules for developing, adopting, or implementing the air pollution control measures contained in the Plan.

Every third year, the District is required to assess the overall effectiveness of its air quality program, including determining the quantity of emission

reductions achieved, and the rate of population and industrial- and vehicular-related emissions growth compared to the assumptions and goals contained in the Plan. The District is also required to assess the extent of air quality improvement, based upon ambient pollutant measurements and best available modeling techniques. These triennial reports are required by law to be adopted by the District at a public hearing and transmitted to the ARB.

The federal Clean Air Act requires nonattainment areas, such as the Basin, to document "reasonable further progress" in achieving incremental reductions of air pollution.

SCAG prepares the portion of the monitoring reports pertaining to local government actions to implement the transportation and land use measures, and submits that information to the District for inclusion in the full monitoring reports, per the SCAG/SCAQMD Memorandum of Understanding.

The development of a program to monitor the implementation of the AQMP began in March 1989. At that time the District Governing Board and SCAG Executive Committee established a Monitoring Working Group to coordinate the monitoring efforts of the District, SCAG, ARB, and EPA in creating a program to effectively monitor the implementation of the AQMP. The Monitoring Working Group is composed of representatives from SCAG, the District, ARB, and EPA. SCAG has also created a monitoring subgroup to provide that agency technical assistance in monitoring SCAG's control measures.

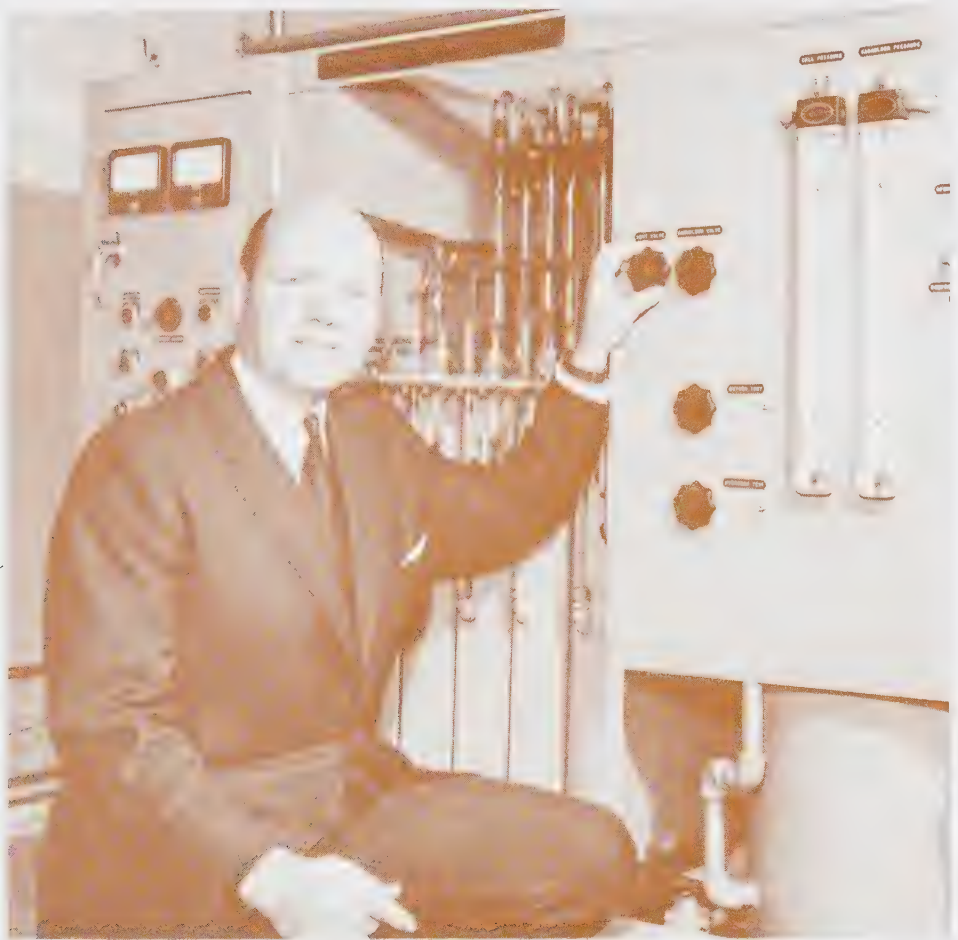
Specifically, the Monitoring Working Group is charged with:

- o developing a program that would monitor all AQMP control measures;
- o determining the contents, format, and process for preparing the monitoring reports required under federal and state law; and
- o identifying performance standards and the methodology for determining the effectiveness of control measures.

The monitoring program developed by the Working Group will be documented in a Monitoring Manual.

VIII TOXIC AIR CONTAMINANTS





K. Alexander Stuart, chairman of Electrolyser Corp., with hydrogen generator

Lighting the Way for Hydrogen Power

Photovoltaic solar cells are connected to a electrolysis device, which separates hydrogen and oxygen from water. The hydrogen is collected and stored for electric generation. The result: a "hydrogen battery" to power cars and trucks, technology developed by Electrolyser Corporation of Canada.

Riverside Community College researchers plan to convert vehicles to run on the hydrogen-derived power source. The solar-and-hydrogen energy combination means the vehicle yields but one emission: harmless water vapor.

CHAPTER 8

TOXIC AIR CONTAMINANTS

Introduction

Clean Air Act Amendments

State Requirements

District Regulatory Program

Impacts of AQMP Measures on Air Toxics

INTRODUCTION

Air pollution regulations at the state and federal level have historically focused on the criteria pollutants (NO_x , SO_x , O_3 , CO, particulates, and lead). However in the past decade, there has been growing concern regarding the potential impacts of other harmful pollutants emitted to the air. These are generally referred to as toxic air contaminants or "air toxics." The health impacts of concern include carcinogenesis, as well as a variety of noncarcinogenic effects, including acute toxicity from accidental releases.

The District has developed a number of rules to control toxic emissions from new and existing sources. These rules originated through either state directives, the federal Clean Air Act, or District rulemaking initiatives.

Control of toxic air contaminants supports the District's attainment strategy in two ways. Co-control of criteria pollutants (primarily ROG and PM_{10}) is obtained through toxics regulation. Also, control measures developed for air toxics are often technology forcing and can be transferred to the control of criteria pollutants. In addition to developing regulatory initiatives to control toxic air contaminants, the District has evaluated AQMP measures to determine if they would increase or decrease emissions of these compounds. For example, a control measure that destroys a toxic organic along with other ozone-forming organic emissions (ROG) would decrease potential air toxics impacts. Conversely, substitution of a non-photochemically reactive chlorinated solvent for ROG may reduce ozone impacts, but would increase emissions of a toxic air contaminant in some circumstances. This chapter provides background on the District's air toxics regulatory program and a preliminary analysis of potential impacts of AQMP measures.

Magnitude of Population Exposure

In order to characterize the extent of the air toxics problem in the region, the District conducted a study to quantitatively estimate cancer risk (i.e., cases of cancer that may be linked to air toxics, and estimates of lifetime individual risks). The study is documented in *The Magnitude of Ambient Air Toxics Impacts from Existing Sources in The South Coast Air Basin*, June 1987.

The study also identified the nature of the problem by identifying specific carcinogenic pollutants and their relative significance as public health risks.

Concerns over carcinogenic air contaminants focus on the risk to the individual (increased probability of contracting cancer) and risk to the population (additional cases that may result from exposure). The results of the study indicated that risks to some individuals could be high, that is, the added lifetime risk of contracting cancer due to exposure could be in the range of one chance in one thousand (1×10^{-3}) to one in one hundred (1×10^{-2}) near some sources. In addition, the population risk assessment indicated that as many as 200 cancers per year may result from ambient levels of these pollutants if current concentrations persist.

Of the 20 carcinogenic air contaminants evaluated in the study, the two which appear to produce the largest risk for the population of the Basin are benzene and hexavalent chromium. Benzene is emitted directly from motor vehicles. Other emission sources include gasoline marketing, stationary gasoline engines, crude oil production, petroleum refineries, and agricultural burning. Hexavalent chromium is emitted directly in the use and production of chromium, such as plating industries and other processes.

Many air toxics and emission sources have not yet been assessed. The lack of emissions data, health data, and exposure data prevented quantitative risk estimates for any additional pollutants. Efforts from recent legislation, such as the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588), will provide the District with a more extensive data base for a thorough assessment of all sources in the Basin and an identification of toxic "hot spots." Initial data gathered under this program will be available in 1991. Additional data will be available in the following three years. This data base will be an important source of information for evaluating planning priorities and assessing the need for regulatory control measures for existing sources within the Basin.

In addition to ambient outdoor exposures, the District is also evaluating exposure to air toxics in specific "microenvironments" that have been identified as having the potential for high concentrations of these pollutants. Such microenvironments include office buildings, enclosed parking garages, gasoline stations, and inside a commuting vehicle.

Results of a District study are contained in a report titled *In-Vehicle Characterization Study in the South Coast Air Basin*, October 1989, and

indicate that the concentrations of many toxic air contaminants are two to four times higher inside commuting vehicles than they are outdoors. Commuter exposure may be influenced by meteorology, vehicle age, and average commute speed. Higher concentrations were detected during the winter season, in older cars, and during commutes with slower average speeds. The District is currently evaluating data from enclosed parking garages and other microenvironments.

CLEAN AIR ACT AMENDMENTS

Title III of the Clean Air Act Amendments of 1990 provides a program for the control of toxic air contaminants from existing sources. The first stage of the program involves the implementation of Maximum Available Control Technology (MACT) for hazardous air pollutants. This will be followed later by a second phase in which the residual risk after control will be evaluated and further controls considered. The District will closely monitor the development of MACT standards at the federal level to ensure that any proposed District regulations meet or exceed MACT. The Act provides for a delegation of the hazardous air pollutant implementation and enforcement provisions to state programs.

STATE REQUIREMENTS

To address concerns regarding toxic air contaminants, the California legislature has adopted several bills to control these compounds. The ARB and local air pollution control districts are required to implement the provisions of many of these bills. The most significant are summarized below:

The Tanner Toxics Act (AB 1807)

The Tanner Toxics Act established the California toxic air contaminant control program (AB 1807, H&S Code Section 39650, *et seq.*) to identify and control toxic air contaminants. Toxic air contaminants are defined as air pollutants that may cause or contribute to an increase in mortality or serious

illness. They are designated as toxic air contaminants by ARB and Department of Health Services (DHS) through an identification process. The ARB, in conjunction with the local air pollution control districts, then develops control measures to reduce emissions. The Tanner Act does not preclude districts from regulating emissions of substances before the ARB has identified the substance as a toxic air contaminant (Western Oil and Gas Association versus Monterey Bay Unified Air Pollution Control District, 49 Cal. 3d 408, 1989).

As of April 1991, fourteen toxic air contaminants have been identified as cancer-causing substances through this identification process: arsenic, benzene, ethylene dibromide, ethylene dichloride, hexavalent chromium, ethylene oxide, asbestos, certain chlorinated dibenzo-p-dioxins and dibenzofurans, cadmium, methylene chloride, carbon tetrachloride, chloroform, trichloroethylene, and vinyl chloride. A number of other substances are currently proposed for identification as toxic air contaminants.

After identification, ARB may adopt air toxic control measures (ATCMs) to reduce ambient concentrations below a specific threshold based on health effects, or to the lowest concentration achievable through use of the best available control technology. Local air pollution control districts must incorporate these measures into their regulatory program or adopt more stringent measures as rules. As of November 1990, ATCMs have been adopted by ARB for hexavalent chromium, benzene, ethylene oxide, and dioxins from hospital incinerators.

Air Toxics "Hot Spots" Information and Assessment Act (AB 2588)

Some of the goals of AB 2588 (H&S Code Section 44300, *et seq.*) are to 1) collect emissions inventories from facilities that use any of the 300 toxic substances currently listed by the ARB, 2) develop health risk assessments for certain facilities that the districts designate as having emissions which may result in adverse public health impacts, and 3) make the health risk assessment information available to the public. AB 2588 requires operators of specified facilities to submit to the appropriate air pollution control districts, by specified dates, comprehensive emissions inventory plans and reports. The districts, in turn, review the plans and emissions inventory reports, and designate facilities into high, intermediate, and low priority

categories based on the reported emissions. Subsequently, facilities designated as high priority must prepare a health risk assessment. To date, 176 facilities in the Basin are required to perform risk assessments. Additional facilities may be designated as high priority in the upcoming months. Facilities found to pose a significant risk are required to notify potentially impacted individuals. All emissions inventory data are updated every two years.

Toxic Emissions Near Schools (AB 3205)

AB 3205 (H&S Code Sections 42301.6 through 42301.9) addresses sources of air contaminants near schools. It requires new or modified sources of air contaminants located within 1000 feet from the outer boundary of a school to give public notice to the parents of school children before an air pollution permit is granted. Air pollution control districts conduct field and data base surveys to identify all existing sources of air contaminants located within one quarter mile of a proposed school siting. Facilities located near schools that could potentially release air contaminants are required to develop risk management and prevention plans. In addition, air pollution control districts may issue orders preventing or mitigating reasonably foreseeable threatening releases when a release could harm individuals at the school.

Air Monitoring of Disposal Sites (AB 3374)

AB 3374 (H&S Code Section 41805.5, *et seq.*) requires owners of solid waste disposal sites or inactive sites to submit to local air pollution control districts a solid waste air quality assessment test report. Local air pollution control districts are required to evaluate these test reports and take appropriate remedial action if the district determines that levels of specified air contaminants pose a health risk to human beings or a threat to the environment.

DISTRICT REGULATORY PROGRAM

Control of toxic air pollutants in the Basin is and will be achieved through rules and regulations already in place or proposed for implementation. Such measures include regulations developed through the state's air toxics program (AB 1807), as well as rules initiated and adopted at the District level. Rules which control criteria pollutants and their precursors are also effective in reducing toxic air pollutants in many instances.

Adopted Toxics Rules

Table 8-1 lists District-adopted toxics rules including those rules adopted through the AB 1807 process. Rule 1401 sets forth the District's approach for assessing and managing risks from new and modified sources of air toxics through the District's permitting program. District Rule 1401 also describes the risk assessment procedures to use in assessing risks from sources that emit cancer-causing compounds and specifies the risk limits for new and modified stationary sources.

Federal regulations under the National Emission Standard for Hazardous Air Pollutants (NESHAPs) are incorporated into District Regulation X by reference. District Rule 1403 augments the NESHAPs for asbestos and provides additional requirements to cover non-NESHAP areas, such as residential renovation and demolition.

TABLE 8-1
Adopted Toxics Rules

Rule	Title	Description	Authority	Adoption Date
1169	Cr ⁺⁶ from Cr Plating and Cr Acid Anodizing Operations	Establishes emission control requirements for chrome plating and chromic-acid anodizing operations	AB 1807	Jun '88
461	Gasoline Transfer and Dispensing	Reduces benzene emissions from the retail sale of gasoline	AB 1807	July '89
1169	Amendment to Rule 1169	Provides additional control options to hard Cr plating and anodizing facilities, and strengthens controls for decorative chrome plating	AB 1807	Sep '89
1403	Asbestos Emissions from Demolition/Renovation Activities	Specifies work practice requirements for demolition and renovation activities involving asbestos-containing materials	District	Oct '89
1404	Cr ⁺⁶ Emissions from Cooling Towers	Bans the use of additives containing Cr ⁺⁶ in industrial and comfort cooling towers	AB 1807	Apr '90
1401	New Source Review of Carcinogenic Air Contaminants	Specifies limits for maximum individual cancer risk and excess cancer cases from new permit units, relocations, or modifications to existing permit units which emit carcinogenic air pollutants	District	Jun '90
1401	Amendments to Rule 1401	Adds 25 more compounds to the compound list of Rule 1401	District	Dec '90

TABLE 8-1 (Continued)
Adopted Toxics Rules

Rule	Title	Description	Authority	Adoption Date
1405	Control of Ethylene Oxide Emissions from Sterilization/Fumigation Processes	Limits ethylene oxide emissions from commercial and medical sterilization equipment, and from quarantine equipment and areas	AB 1807	Mar. '91
1410	Hydrogen Fluoride (HF) Storage and Use	Places restrictions on the storage and use of HF in the Basin, with a final phaseout date for HCFC production facilities and refineries	District	Apr. '91
1406	Control of Dioxin Emissions from Medical Waste Incinerators	Requires the use of T-BACT for all medical waste incinerators to limit dioxin and other toxic emissions	AB 1807	Apr. '91
1414	Control of Asbestos Emissions from Asbestos-Containing Serpentine Rock in Surface Applic'ns	Eliminates any future use of asbestos-containing serpentine material for the surfacing of unpaved areas	AB 1807	May 1991
Reg. X	NESHAPs	Incorporates federal NESHAPs into District rules by reference	Federal	ongoing

Proposed Toxics Rules

Rules currently under development include those addressing cancer risk from currently regulated and unregulated sources of air toxics and several rules implementing ARB's air toxics control measures. In addition to rules addressing carcinogenic risk, the risks from noncarcinogens as well as accidental releases of acutely hazardous materials will also be addressed in the future. Several of the proposed air toxics rules are outlined below:

Proposed Rule 1401.1 - Non-carcinogenic Toxic Air Contaminants. This proposed rule would expand existing Rule 1401 (New Source Review for Carcinogenic Air Contaminants) to also address noncarcinogenic emissions of health concern. A key component of this effort will be the development of a list of acceptable exposure levels for a variety of compounds of concern.

Proposed Rule 1402 - Existing Sources of Toxic Air Contaminants. The proposed rule would address the reduction of exposure and risks from existing sources of toxic air contaminants. The information obtained under the Air Toxics Hot Spots Act will be important in setting priorities for sources to be regulated. It should be noted that reductions in levels of toxic air contaminants may also reduce criteria pollutant emissions, resulting in emissions reduction credits. This concept is often referred to as co-control.

Proposed Rule 1408 - Indirect Source Review for Toxic Air Contaminants. The concept of this proposed rule is described in control measure CM#90M-H-9. The goal is to use available information on sources of toxic air contaminant emissions and risks to prevent the inappropriate siting of sensitive receptors (schools, residential areas, hospitals) near sources of toxic air contaminants. Development of this rule will also require additional data on air toxics risks from freeways and major traffic thoroughfares to estimate their contribution to area-wide air toxics risks.

Proposed Rule 1412 - Prevention of Accidental Releases of Acutely Hazardous Materials. The District has recently adopted Rule 1410 to address potential health risks from accidental releases hydrogen fluoride. The Rule calls for mitigation of potential risks in conjunction with a schedule for phase-out of the material. A series of rules will address the reduction of risks from other acutely hazardous materials such as chlorine and ammonia.

Proposed rules scheduled for adoption are shown in Table 8-2.

Data from the AB 2588 program will be critical for the development of several of these measures. Under AB 2588, facilities which emit toxic air contaminants are entered into the program in a sequential manner based upon their level of criteria pollutant emissions. Facilities first submit an inventory plan outlining how they intend to quantify toxic emissions. This plan is then reviewed by the District and, upon approval, the facilities prepare and submit a toxics emissions inventory. These inventories are updated every two years. The District groups facilities into priority categories using this emission data and those facilities in the highest category

must submit a risk assessment. The program therefor provides for detailed emissions estimates and risk studies for facilities throughout California. This information is of great importance in development of several of the proposed rules (PR) listed above. For PR 1401.1 and PR 1402 the inventory will provide information on the extent of the toxics problem and affected sources. The risk information will be entered into a Geographic Information System (GIS), a database used to map out information (in this case toxics levels) over large geographic areas for PR 1408. The integration of AB 2588 information into the District toxics rule development program is shown in Table 8-3.

TABLE 8-2
Proposed Toxics Rules

Rule	Title	Description	Authority	Proposed Adoption Date
1401.1	Non-Carcinogenic Toxic Air Contaminants	Evaluate noncarcinogenic emissions from new/modified sources	District	Second Quarter 1992
1402	Control of Air Contaminants from Existing Sources	Addresses risk of carcinogenic air pollutants from existing sources	District	First Quarter 1992 and on-going
1407	Control of Cd from Secondary Smelters	Limits emissions of Cd from secondary smelters	AB 1807	Late 1991/ Early 1992
1408	Indirect Source Review for Toxic Air Contaminants	Examines suitability of land uses near existing sources of toxic air contaminants	District	Mid 1992
1409	Control of Halogenated Solvent Emissions		AB 1807	Mid 1992
1412	Prevention of Accidental Releases of Acutely Hazardous Materials	Prevention and/or mitigation of accidental releases	District	Early 1992 and on-going

**Table 8-3 Relationship Between Toxics Hot Spots Program (AB2588) Data
and District's Proposed Air Toxics Rules**

	First Quarter 1991	Second Quarter 1991	Third Quarter 1991	Fourth Quarter 1991
AB2588	Evaluation and approval of Group II* Emission Inventory Plans	<p>Receive Group I* Risk Assessments (approximately 170)</p> <p>Prioritize remaining Group I facilities for performing risk assessments</p> <p>Ongoing approval of Group II Emission Inventory Plans</p>	<p>Review Group I risk assessments</p> <p>Receive Emission Inventory Reports from Group II facilities</p> <p>Evaluate "Significant Risk" level and format for notification</p>	<p>Prioritize Group II Facilities</p> <p>Initial notifications (continues through remainder of AB 2588 program)</p> <p>Develop GIS database</p>
District Rules				Draft Proposed Rule 1402 and circulate for discussion
	First Quarter 1992	Second Quarter 1992	Third Quarter 1992	Fourth Quarter 1992
AB2588	<p>Evaluate remainder of Group I Risk Assessments</p> <p>Approve Group III Inventory Plans</p> <p>Load risk data into GIS system</p>	<p>Receive Group II Risk Assessments</p> <p>Receive Group III Emission Inventory Reports</p> <p>Continuing Update of GIS --></p>		Prioritize Group III Facilities
District Rules	<p>Adopt Rule 1402</p> <p>Circulate PR 1401.1: Noncarcinogenic Air Contaminants</p> <p>Circulate PR 1408: ISR for Toxics</p>	Adopt Rule 1401.1	Adopt Rule 1408	

* Group I refers to facilities with >25 tons per year of criteria pollutant emissions, Group II 10-25 tons, Group III < 10 tons.

IMPACTS OF AQMP MEASURES ON AIR TOXICS

The primary goal of AQMP measures is to reduce criteria pollutant concentrations. However, these measures may also decrease or, in some cases, increase emissions of toxic air contaminants. This may occur by a variety of mechanisms, such as solvent substitution or by changing the chemical characteristics (i.e., via incineration or other control processes). The following tables summarize the possible impacts of AQMP measures on air toxics. For the purposes of this analysis, air toxics are defined as carcinogenic air contaminants and compounds listed under the AB 2588 process.

Control measures within the same subgroup of each tier that have similar potential impacts are grouped together. Details of the impacts of the proposed measures are presented in the Environmental Impact Assessment Report of the AQMP. A summary table listing all District control measures and their impacts on toxics air quality is provided in Table 8-4.

As shown in the table, most of the AQMP control measures reduce emissions of toxic compounds. Some measures in Subgroup B: Petroleum and Gas Production source category and all measures for motor vehicle and transportation source categories would reduce toxic components of gasoline such as benzene, toluene, and xylene.

Examples of measures that have the potential to increase emissions of air toxics are the NO_x control measures, such as selective catalytic and non-catalytic reduction (SCR and SNCR, respectively). These measures may increase spillage and fugitive emissions of ammonia. SO_x control methods, such as hydrotreating of sulfur-containing exhaust gas, will produce hydrogen sulfide and may produce copper, arsenic, and sodium hydroxide emissions. Use of alternative fuels may increase methanol and aldehyde emissions. Electrification may cause greater emissions of benzene, aldehydes, metals and polynuclear aromatic hydrocarbons (PAHs) from fuel-based power-generating facilities. However, if the process being electrified was previously powered by direct combustion of fossil fuels, then electrification may result in an overall decrease in toxics emissions.

The potential for increased toxics emissions also depends on the approach an industry selects to comply with the specific control measures proposed for that category. For example, coating emissions can be controlled through five

approaches: 1) conversion to solventless coating systems; 2) improvement of transfer efficiency so that less solvent-based paint is used; 3) switching to high solids and/or water-based coatings; 4) utilizing add-on control equipment; and 5) substituting reactive solvents with nonreactive ones. Any one of these approaches will have a different effect on air toxics emissions. Hence, the impact of measures directed at coating operations cannot be assessed until a specific approach has been selected.

As each measure is translated into a rule, a technology feasibility study will be performed to determine the availability of alternatives and the use of the best available controls to minimize emissions. Each rule will be evaluated for its environmental impact and will take into consideration its overall effect on criteria and toxics emissions. Rules that afford the greatest risk reduction will be prioritized to a higher ranking and those that may have a significant negative impact on air quality (as a result of increases in air toxics emissions) may have to be deleted or prioritized to a lower ranking until new technology is developed.

As technology and implementation development occur, the analysis provided above may have to be revised. Such long-term refinements will require 1) monitoring of progress and 2) flexibility to respond to the technology results. The District is committed to further assess the AQMP strategies, to achieve reduction of criteria and toxic air pollutants, and to develop rules which will directly control toxic air contaminants.

TABLE 8-4
Summary of the Impacts of District AQMP Control Measures on
Toxic Air Contaminants

TIER I. SUBGROUP A: SURFACE COATING AND SOLVENT USE

	CONTROL CATEGORY	CONTROL METHOD	IMPACT ON AIR TOXICS
A-A-1.	Arch. Coating	user emission charges	decrease
A-A-2.	Surface Coating	improve procedures solvent reformulation	decrease unknown ⁽¹⁾
A-A-3.	Domestic Products	alternative application ban aerosols reformulation	decrease decrease unknown ⁽¹⁾
A-A-4.	Solvent Waste	outreach program proper disposal waste minimization	decrease decrease decrease
P-A-1.	Wood Flatstock Coating	alternative coating methods coating reformulation eliminate exemptions recordkeeping	decrease unknown ⁽¹⁾ unknown ⁽²⁾ decrease
P-A-2.	Auto. Assembly Coating	add-on control equipment evening shift solvent reformulation transfer efficiency	decrease ⁽³⁾ no impact unknown ⁽¹⁾ decrease ⁽³⁾
P-A-3.	Paper, Fabric, and Film Coating	coating reformulation recordkeeping	unknown ⁽¹⁾ decrease
P-A-4.	Metal Cleaning and Degreasing	add-on control equipment eliminate exemptions increase freeboard ratio outreach program	decrease ⁽³⁾ decrease decrease decrease
P-A-5.	Perchloroethylene Dry Cleaning	eliminate exemptions replace transfer system	decrease decrease ⁽³⁾
P-A-6.	Electronic Comp. Manufacturing	add-on control equipment housekeeping positive photoresist	decrease ⁽³⁾ decrease no impact

TABLE 8-4 (Continued)
Summary of the Impacts of District AQMP Control Measures on
Toxic Air Contaminants

TIER I. SUBGROUP B: PETROLEUM AND GAS PRODUCTION

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
A-B-1.	Gasoline Transfer: Phase I vapor recovery	decrease ⁽⁴⁾
A-B-2.	Gasoline Transfer: Phase II vapor recovery	decrease ⁽⁴⁾
A-B-3.	Pleasure Boat Fueling	decrease ⁽⁴⁾
A-B-4.	Organic Liquid Transfer	decrease ⁽⁴⁾
A-B-5.	Gasoline Dispensing Facility	decrease ⁽⁴⁾
A-B-6.	Utility Engine Fueling	decrease ⁽⁴⁾
A-B-7.	Gasoline Transfer: spillage control	decrease ⁽⁴⁾
A-B-8.	Natural Gas Transmission/Distribution Lines	no impact
A-B-9.	Process Drain	decrease
P-B-1.	Fluid Catalytic Cracking Unit (SO _x)	no impact ⁽⁵⁾
P-B-2.	Fluid Catalytic Cracking Unit (NO _x)	decrease ⁽³⁾
P-B-3.	Gas-Fired Refinery Process Heater	decrease ⁽⁶⁾
P-B-4.	Fluid Catalytic Cracking Unit (PM ₁₀)	no impact ⁽⁵⁾
P-B-5.	OCS Exploration, Development, and Production	unknown ⁽⁷⁾
P-B-6.	Refinery Flare	decrease
P-B-7.	Bulk Terminals	decrease ⁽⁴⁾

TIER I. SUBGROUP C: COMMERCIAL AND INDUSTRIAL PROCESS

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
A-C-1.	Large Commercial Bakeries	decrease ⁽⁸⁾⁽⁹⁾
A-C-2.	Commercial Charbroiling	decrease ⁽⁸⁾⁽⁹⁾
A-C-3.	Laboratory Fume Hoods	decrease
A-C-4.	Deep Fat Frying	decrease ⁽⁸⁾⁽⁹⁾
A-C-5.	Miscellaneous Combustion Sources	decrease
A-C-6.	Internal Combustion Engines (<50 HP)	increase ⁽¹⁰⁾
P-C-1.	Rubber Products	decrease
P-C-2.	Afterburner	dec./inc. ^{(8)(9)/(10)}
P-C-3.	Woodworking Operation	no impact
P-C-4.	Small Boiler/Process Heater	decrease ⁽⁸⁾⁽⁹⁾
P-C-5.	Metal Melting Furnace	increase ⁽¹⁰⁾
P-C-6.	Curing/Drying Oven	increase ⁽¹⁰⁾
P-C-7.	Glass Melting Furnace	decrease ⁽⁸⁾⁽⁹⁾
P-C-8.	Cement Kiln	increase ⁽¹⁰⁾

TABLE 8-4 (Continued)
**Summary of the Impacts of District AQMP Control Measures on
 Toxic Air Contaminants**

TIER I. SUBGROUP D: RESIDENTIAL AND PUBLIC SECTOR

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
A-D-1.	Biodegradable Solid Waste	decrease
A-D-2.	Swimming Pool Heating	decrease
A-D-3.	Residential/Commercial Water Heating	decrease
P-D-1.	Publicly Owned Treatment Works (POTW)	decrease

TIER I. SUBGROUP E: AGRICULTURAL PROCESS

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
A-E-1.	Pesticide Application	decrease
A-E-2.	Livestock Waste	decrease ⁽¹¹⁾⁽¹²⁾
A-E-3.	Agricultural Dust	no impact

TIER I. SUBGROUP F: OTHERS

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
A-F-1.	Best Available Retrofit Control Technology	unknown ⁽⁷⁾
A-F-2.	Construction Site	no impact ⁽¹²⁾
A-F-3.	Ammonia Emissions	unknown ⁽⁷⁾
A-F-4.	Building Construction	unknown ⁽¹⁾
A-F-5.	Wind Erosion (PM ₁₀)	no impact
P-F-1.	Fuel Oil and Fossil Fuel: phaseout	decrease ⁽⁴⁾⁽⁸⁾
P-F-2.	Emission Minimization Management Plan	unknown ⁽⁷⁾
P-F-3.	Marketable Permit Program	no impact

TABLE 8-4 (Continued)
Summary of the Impacts of District AQMP Control Measures on
Toxic Air Contaminants

TIER I. SUBGROUP G: MOTOR VEHICLES

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
M-G-1.	Zero Emission Urban Bus Implementation	decrease (3)
M-G-2.	Clean Fuel Retrofit of Transit Bus	decrease (8)
M-G-3.	Radial Tires on Light-Duty Vehicle	decrease
M-G-4.	Clean Fuel in New Fleet Vehicle	decrease (8)
M-G-5.	Motor Vehicle Buyback Program	decrease (8)
M-G-6.	Dealership Cold Start	decrease (8)
M-G-7.	Curb Idling	decrease (8)
M-G-8.	Aerodynamic Device for Truck	decrease (8)
M-G-9.	Advertising Vehicle	decrease (8)
M-G-10.	Refrigerated Transportation	decrease (8)
M-G-11.	Inspection and Maintenance Program Enhancement	decrease (8)
M-G-12.	Oxygenated Fuels Program	decrease (8)

TIER I. SUBGROUP H: TRANSPORTATION SYSTEM AND LAND USE

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
M-H-1.	Environmental Review Program	unknown
M-H-2.	Trip Reduction	decrease (8)
M-H-3.	Supplemental Development Standard	unknown
M-H-4.	Special Activity Center	decrease (8)
M-H-5.	Enhanced Regulation XV	decrease (8)
M-H-6.	Truck Program	decrease (8)
M-H-7.	Registration Program	decrease (8)
M-H-9.	Sensitive Receptor Certification	decrease

TABLE 8-4 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Toxic Air Contaminants

TIER I. SUBGROUP I: OFF ROAD VEHICLE

	CONTROL CATEGORY	IMPACT ON AIR TOXICS
M-I-1.	Ship Berthing	decrease (3)
M-I-2.	Jet Aircraft Engine	decrease (8)
M-I-3.	Marine Vessel Tank	decrease (5)
M-I-4.	Marine Diesel Operation	decrease
M-I-5.	Sulfur Content of Marine Fuel Oil	decrease (3)
M-I-6.	Military Aircraft	decrease (8)
M-I-7.	Leaf Blower	decrease
M-I-8.	Construction and Farm Equipment	decrease (8)

TIER I. ENERGY CONSERVATION

	CONTROL CATEGORY	CONTROL METHOD	IMPACT ON AIR TOXICS
E-C-1A.	Commercial Sector	Electricity Savings	decrease (3)
E-C-1B.	Commercial Sector	Natural Gas Savings	decrease (3)
E-C-2A.	Industrial Sector	Electricity Savings	decrease (3)
E-C-2B.	Industrial Sector	Natural Gas Savings	decrease (3)
E-C-2C.	Industrial Sector	Glass Recycling	decrease (3)
E-C-2D.	Industrial Sector	Paper Recycling	decrease (3)
E-C-3.	Local Gov't Sector	Energy Conservation	decrease (3)
E-D-1A.	Residential Sector	Electricity Savings	decrease (3)
E-D-1B.	Residential Sector	Natural Gas Savings	decrease (3)

TABLE 8-4 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Toxic Air Contaminants

TIER II & III. SURFACE COATING AND SOLVENT USE

CONTROL CATEGORY	IMPACT ON AIR TOXICS
Consumer Products	unknown ⁽¹³⁾
High-Transfer Efficiency/Robotic Application	decrease
Nonsolvent-Based Coating Reformulation	decrease
Outreach and Monitoring Program	unknown ⁽¹⁾

TIER II & III. STATIONARY SOURCES

CONTROL CATEGORY	IMPACT ON AIR TOXICS
Paved Roads	unknown ⁽¹³⁾
Emission Charge	unknown ⁽¹³⁾
Export Fee on Petroleum Products	unknown ⁽¹³⁾
- Best Available Retrofit Control Technology (BARCT)	decrease

TIER II & III. TRANSPORTATION MEASURES

CONTROL CATEGORY	IMPACT ON AIR TOXICS
Low-Emission Freight Vehicle	decrease ⁽⁸⁾
Low-Emission Light and Medium Duty Vehicles	decrease ⁽⁸⁾
Low-Emission Transit Bus	decrease ⁽⁸⁾
Stricter Emissions for Off-Road Vehicles	decrease

TABLE 8-4 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Toxic Air Contaminants

CONTINGENCY MEASURES

CONTROL CATEGORY	IMPACT ON AIR TOXICS
T-1. Additional Tax on Motor Vehicle Gasoline and Diesel	decrease
T-2. Limits on Vehicle Registration	decrease
T-3. Emission Charge on Parking Lots	decrease
T-4. Emission Charge on Vehicle Use	decrease
T-5. Reduce Vehicle Miles Travelled to 1985 Level	decrease
T-7. Time and Place Control Measure	decrease
T-8. More Stringent Emission Standard	decrease
T-9. Emission Charge on Stationary Sources (> 10 tpy)	decrease
T-10. Zero Emission Vehicles	decrease

NOTES

- Potential impacts are difficult to predict and quantify since information on the nature of reformulated substitutes, quantities, and sources are not available.
- This control approach may encourage more facilities to use exempt, chlorinated solvents.
- This control method will decrease overall emissions of aldehydes, benzene, metals, and polycyclic organic matter; however, the associated energy requirements may increase emissions of these compounds at power plants.
- This control method would reduce fugitive emissions of fuel components, such as benzene and toluene.
- Hydrotreating the feed stream may emit copper, arsenic, sodium hydroxide, and hydrogen sulfide; however, these pollutants are ranked low on the priority list of compounds to be controlled under state and federal requirements.
- Controlling particulate emissions would reduce hydrocarbon and metal emissions.
- Potential impacts are difficult to predict and quantify since types and combinations of pollutants, sources, control technologies, operating assumptions, etc., are abundant.
- Substitution of cleaner burning fuels (methanol, ethanol, natural gas, propane, etc.) for residual fuel oil, diesel, or gasoline should result in an overall decrease in toxic air contaminant emissions (organics and metals). However, there may be increases in formaldehyde emissions in some cases.
- The use of combustion devices to control ROG emissions may increase or decrease air toxic impacts depending on the particular use. If the material to be destroyed is of low toxicity, air toxics may increase due to products of incomplete combustion. However, destruction of organic emissions may also destroy toxic compounds leading to an overall air toxics benefit.
- The control method may add ammonia emissions. Resulting ambient concentrations would not be expected to cause adverse health impacts.
- Decreased composting may reduce ammonia emissions.
- Increased fuel consumption may emit more benzene and polycyclic organic matter.
- Emission fees would not guarantee emission reductions.

IX GLOBAL WARMING AND OZONE DEPLETION





Steve McCaughey and Rebecca Loudermilk of Irvine Spectrum Transportation Management Association, with Mike Strawn of Parker Hannifin

“Decongesting” a Bad Case of Gridlock

As sure as traffic clogs Orange County’s thoroughfares, the Irvine Spectrum Transportation Management Association (TMA) is an example of just what the doctor ordered for helping companies come to grips with the drudgery of commuting. They put a creative spin on carpooling, vanpooling, bicycling, alternative work schedules, anything that businesses can deploy to give workers—and air quality—a break.

Established in 1986, the association—also known as SPECTRUMOTION—today designs employee transportation systems for more than 500 businesses, which account for more than 16,000 commuters.

CHAPTER 9

GLOBAL WARMING AND OZONE DEPLETION

Introduction

Summary of Regulatory Efforts

Emissions: Estimates and Reductions

Other Impacts of AQMP Control Measures

INTRODUCTION

Global warming is an upset in the earth's energy balance in which more energy is retained than is lost into space. The result is a heating of the earth's atmosphere. The imbalance is caused by the build-up of "greenhouse" gases which absorb energy and prevent it from passing out into space. Warming of the earth's atmosphere could change heat stress and disease patterns, raise the sea level, and alter the hydrological cycle, affecting all natural systems, particularly primary productivity systems.

Stratospheric ozone depletion is the slow destruction of an upper atmospheric layer of naturally occurring ozone which protects the earth from the damaging effects of solar ultraviolet radiation. Certain gases released by human activities are able to migrate to the stratosphere (between 10 and 30 miles above the earth's surface) to participate in a complex reaction leading to the destruction of stratospheric ozone. Increased ultraviolet radiation can cause skin cancers, reduction in the immune system, cataracts, visual aging, and retinal degeneration. Current analysis projects that fatal skin cancers in the U.S. could rise steadily to an additional 10,000 cases per year in 2010.

Greenhouse gases include carbon dioxide (CO_2), chlorofluorocarbons (CFCs) and other halogenated hydrocarbons, methane (CH_4), nitrous oxide (N_2O), and surface level ozone. CFCs and halogenated hydrocarbons (including methyl chloroform or TCA) are also ozone depleters and have the greatest potential to contribute to global warming. One CFC molecule contains 20,000 times more heat-trapping power than CO_2 . Phasing out their future use and recycling current CFC waste have dual environmental benefits.

Global warming and stratospheric ozone depletion can significantly affect the District's effort to achieve compliance with ambient air quality standards. Increases in global temperature and ultraviolet radiation will increase the smog-forming potential of the Basin and interfere with the efforts to achieve federal and state ambient air quality standards for ozone.

Past practice has been to exempt CFCs and other global-warming and ozone-depleting gases from regulation as Reactive Organic Gases (ROGs) due to

their non-reactivity in the troposphere. This exemption has led to increased usage and dependency on these compounds. As international, national, and local efforts limit emissions of CFCs and other global-warming and ozone-depleting gases; control measures, substitutes, and alternatives are required to reduce tropospheric ozone and protect stratospheric ozone.

Although international cooperation will be required to stabilize and reduce greenhouse and ozone-depleting gases, the District has an appropriate leadership role and responsibility to adopt policies without waiting for action from other quarters. Policies that have linkages to other benefits, principally in the areas of reducing air pollution, achieving greater gains in energy efficiency, and improving competitiveness in world markets, are worthwhile.

SUMMARY OF REGULATORY EFFORTS

International protocols are currently being developed to reduce carbon dioxide and other greenhouse gas emissions but the regulation of CFCs has received the most cooperative international effort.

International: Montreal Protocol

Worldwide concern over the destruction of the stratospheric ozone layer led to an international agreement in 1987 known as the Montreal Protocol. Its major provisions include a 50 percent reduction from 1986 levels in the use of CFCs by 1998, and a freeze on the use of halons at 1986 levels, starting in 1992. A follow-up meeting in London on June 1990 led to a unanimous agreement by the participating countries to phase out CFCs, halons, and carbon tetrachloride by the year 2000. Methyl chloroform was added to the list of compounds to be controlled with an ultimate phaseout date of 2005. The Montreal Protocol will be reviewed again in 1992 to determine if the phaseout schedule for CFCs and other ozone-depleting compounds can be further accelerated.

Federal: Title VI of the 1990 Clean Air Act Amendments

The United States implemented its obligations under the Protocol through federal regulations, which require all U.S. CFC and halon producers to comply with the Protocol's phase-out schedule. Revisions to these regulations will be necessary to include the requirements of Title VI of the 1990 Clean Air Act Amendments. In addition to production and consumption phase-out schedules, Title VI includes a national recycling and emission reduction program which will establish standards and requirements regarding the use and disposal of CFCs and halons during the service, repair, or disposal of 1) appliances and industrial process refrigeration and 2) servicing of motor vehicle air conditioners.

District Policy

The District adopted a "Policy on Global Warming and Stratospheric Ozone Depletion" in April 1990. The main components of the Policy are as follows:

- o Requires an evaluation on a rule-by-rule basis of the availability of alternatives and public health and safety issues associated with ozone-depleting compounds and their replacement alternatives.
- o Phases out the use of chlorofluorocarbons (CFCs) and halons by January 1, 1997 and allows a three-year extension for extenuating circumstances.
- o Phases out the use of methyl chloroform (TCA or 1,1,1-trichloroethane) and HCFCs at the earliest practicable date.
- o Requires the development of a rule for recycling and proper disposal of CFCs.
- o Calls for strategies to reduce carbon dioxide emissions in the 1991 revision to the AQMP.
- o Supports the vigorous implementation of measures to reduce vehicle miles traveled.
- o Calls for strategies to reduce methane emissions, including reassessment of existing District regulations that exempt methane.
- o Calls for the development of a preliminary inventory of sources which cause or contribute to global environmental change.
- o Supports funding for research in alternative fuels and materials to control pollutant emissions that cause global environmental change.
- o Seeks the cooperation of local, state, and federal agencies in the development and implementation of ozone-depleting strategies.

Status of Policy Implementation

Since adoption of the Policy, the District has taken actions to implement its provisions. Among these are the development of two recycling regulations; the development of the 1991 AQMP control strategies to reduce emissions of carbon dioxide and methane; the development of an emissions inventory for global-warming and ozone-depleting gases; and direct funding of research aimed at the development of alternative substances and processes.

Adopted Rules

Table 9-1 lists adopted rules to control emissions of gases that contribute to global warming and ozone depletion. Rule 1175, Control of Emissions From the Manufacture of Polymeric Cellular (Foam) Products, is the first District rule to limit emissions of ozone-depleting and global-warming gases. The rule requires foam blowing operations to reduce emissions of CFCs by 40 percent in 1991 and discontinue its use by 1994.

Rule 1405, primarily a toxic rule to control ethylene oxide (EtO) emissions from sterilization and fumigation processes, also controls CFC emissions through the use of recovery or recycling equipment. In addition, Rule 1405 eliminates the use of CFC-12 as diluents in the sterilization process by 1997.

As called for in the Policy, CFC recycling regulations are being developed and prioritized for rulemaking. End-use sectors that have the largest quantity of CFCs available for recycling, and where recycling is feasible and cost-effective are given the highest priority. Use of CFCs for motor vehicle air conditioners account for approximately 20 percent of the ozone-depleting chemicals used in the Basin. Technology for recovery and recycling of CFCs for automobile air conditioner is commercially available. Hence, the first recycling rule adopted by the District is Rule 1411, Recovery or Recycling of Refrigerants From Motor Vehicle Air-Conditioners. This rule requires the use of recovery or recycling equipment for installation, service, or repair of motor vehicle air conditioners; or any other related repairs including vehicle salvage that could cause the release of refrigerant.

TABLE 9-1
Adopted Global Warming and Ozone Depletion Rules

Rule	Title	Description	Adoption Date
1175	Control of Emissions from Manufacture of Foam Products	Requires foam blowing operations to reduce CFC emissions by 40% in 1991 and discontinue its use by 1994	Nov. 1990
1405	Control of EtO and CFC emissions from Sterilization or Fumigation Processes	Controls EtO and CFC emissions from commercial and medical facilities	Dec. 1990
1411	Recovery or Recycling of Refrigerants from Motor Vehicle Air Conditioners	Requires recovery or recycling equipment during motor vehicle servicing or dismantling to reduce CFC emissions	March 1991

Proposed Rules

Table 9-2 lists proposed rules to reduce emissions of global-warming and ozone-depleting gases. Proposed Rule 1415, Reduction of CFC Emissions From Stationary Refrigeration and Air-Conditioning Systems, will require the use of recovery and recycling equipment during repair, service, or installation of these systems. Proposed Rule 1418, Reduction of Halon Emissions, may either require recycling or a restriction on the use of these compounds. Halons are primarily used in building fire-suppressant systems and in portable fire extinguishers.

One of the components of the District Policy on global climate change is to examine existing VOC regulations and remove the exempt status for CFCs or methane. For many of these rules, this change will have no significant impact to affected industries. For rules dealing with petroleum and gas extraction, processing, and waste treatment processes, solvents, etc., additional controls

may be required. This will result in specific amendments on a rule-by-rule basis.

TABLE 9-2
Proposed Global Warming and Ozone Depletion Rules

Rule	Title	Description	Adoption Date
1415	Reduction of CFC Emissions from Stationary Refrigeration and Air Conditioning Systems	Requires recovery or recycling equipment during industrial or commercial refrigerator or air conditioner servicing or dismantling to reduce CFC emissions	2nd qtr. 1991
---	VOC Rules Amendments	Eliminates exempt status for methane and CFCs	1st qtr. 1992
1416	Non-Essential Uses of CFCs	Restricts non-essential uses of CFCs	1st qtr. 1992
1417	CFC-Based Transport Refrigeration Systems	Restricts use of CFC-based transport refrigeration systems	3rd qtr. 1992
1418	Reduction of Halon Emissions	Requires recycling of halons and may eliminate its use in certain applications	4th qtr. 1992
1419	Control of Emissions from Livestock Waste	Requires alternative practices to lagoon composting to reduce methane emissions	4th qtr. 1992

Proposed Rule 1417 (Control Measure M-G-10) and 1419 (Control Measure A-E-2) are control measures that have been prioritized for early implementation based on methodology discussed in Chapter VI. Proposed Rule 1417 will restrict the use of CFC refrigerants in transport refrigeration systems. Proposed Rule 1419, Control of Emissions from Livestock Waste,

will require alternative practices to open or lagoon composting to reduce primarily methane emissions. Lagoon composting is the collection of solid manure into ponds where they are allowed to dry out. Simultaneous aerobic digestion releases methane, carbon dioxide, ammonia, and hydrogen sulfide to the atmosphere. Alternative practices to reduce such emissions include better housekeeping, sewage treatment, or anaerobic digestion.

Research Projects

The District, through its Office of Technology Advancement, is supporting projects to develop alternatives to the use of stratospheric ozone-depleting compounds. A current project is the development of alternatives used in defluxing and degreasing operations in the aerospace industries. The research effort encompasses seven separate projects: low-cost ROG coatings, low-cost paint spray equipment, a solvent data base, dense phase gas cleaning, aqueous cleaners, organic solders, and fluxless soldering. To date, five of the seven projects are expected to be completed by early 1991. Technologies without proprietary restrictions developed from this effort will be reported and will benefit both aerospace and non-aerospace manufacturers.

EMISSIONS: ESTIMATES AND REDUCTIONS

An inventory of global-warming and stratospheric ozone-depleting gas emissions was compiled for the Basin. A detailed discussion of the inventory data is provided in Technical Report III-E. A summary of the data is presented in the following sections.

Compounds included in the inventory for global-warming gas emissions include carbon dioxide, methane, CFCs, methyl chloroform, and carbon tetrachloride. Nitrous oxide is also a known global-warming gas, but was not included in the inventory because emissions or activity data were not readily available for California. Also, current emission factors available for the key sources of nitrous oxide (i.e., biomass burning and fertilizer applications) are highly uncertain and may not represent the actual emissions generated from these sources. Ozone-depleting gases include the CFCs, halons, methyl chloroform, and carbon tetrachloride.

AQMP measures that will reduce emissions of carbon dioxide and methane include transportation and utility-related measures, as well as energy conservation measures. Various transportation measures designed to reduce congestion, the number of vehicles on the road, and the miles traveled by passenger cars and trucks will reduce per capita carbon dioxide emissions. CFC reductions are expected due to international and local phaseout schedules, as well as the implementation of proposed District rules. A list of 1991 AQMP measures contributing to the reductions of these compounds is shown in Table 9-3.

TABLE 9-3

List of 1991 District AQMP Control Measures
Reducing Chlorofluorocarbons, Carbon Dioxide, and Methane

General

Number	Description
A-F-1.	Installation of Best Available Retrofit Control Technology
P-F-2.	Emission Minimization Management Plan

Chlorofluorocarbons

Number	Description
A-A-3.	Control of Emissions from Domestic Products
M-G-10.	Eliminate CFC-Based Transport Refrigeration Systems

Carbon Dioxide

Number	Description
A-D-2.	Control of Emissions from Swimming Pool Water Heating
A-D-3.	Control of Emissions from Residential and Commercial Water Heating
P-B-5.	Control of Emissions from Outer Continental Shelf Exploration, Development, and Production
P-B-6.	Control of Emissions from Petroleum Refinery Flares
P-C-4.	Control of Emissions from Small Boilers and Process Heaters
P-C-5.	Control of Emissions from Metal Melting Furnaces
P-C-6.	Control of Emissions from Curing and Drying Ovens
P-C-7.	Control of Emissions from Glass Melting Furnaces
P-C-8.	Further Control of Emissions from Cement Kilns
P-F-1.	Phase Out Stationary Source Fuel Oil and Solid Fossil Fuel Use
E-C-1A.	Commercial Sector - Electricity Savings
E-C-1B.	Commercial Sector - Natural Gas Savings
E-C-2A.	Industrial Sector - Electricity Savings
E-C-2B.	Industrial Sector - Natural Gas Savings
E-C-2C.	Industrial Sector - Glass Recycling
E-C-2D.	Industrial Sector - Paper Recycling
E-C-3.	Local Government Conservation Programs
E-D-1A.	Residential Sector - Electricity Savings
E-D-1B.	Residential Sector - Natural Gas Savings

TABLE 9-3 (Continued)

List of 1991 District AQMP Control Measures
Reducing Chlorofluorocarbons, Carbon Dioxide, and Methane

Carbon Dioxide (continued)

Number	Description
M-G-1.	Zero Emission Urban Bus Implementation
M-G-5.	Motor Vehicle Buyback Program
M-G-6.	Eliminate Excessive Car Dealership Coldstarts
M-G-7.	Eliminate Excessive Curb Idling
M-G-8.	Aerodynamic Device for Trucks
M-G-9.	Eliminate Emissions from Advertising Vehicles
M-G-10.	Eliminate CFC-Based Transport Refrigeration Systems
M-G-11.	Inspection and Maintenance Program Enhancements
M-H-2.	Trip Reduction for Schools
M-H-4.	Special Activity Centers
M-H-5.	Enhanced Regulation XV
M-H-6.	Truck Programs
M-I-1.	Control of Emissions from Ship Berthing Facilities
M-I-2.	Control of Emissions from Jet Aircraft
M-I-4.	Control of Emissions from Marine Diesel Operations
M-I-6.	Lower Emissions from Military Aircraft
M-I-7.	Eliminate Leaf Blowers
M-I-8.	Emission Standards for Construction and Farm Equipment

Methane

Number	Description
A-B-4.	Control of Emissions from Organic Liquid Transfer
A-B-8.	Control of Fugitive Methane Emissions from Natural Gas Transmission/Distribution Lines
A-D-1.	Out-of-Basin Transport of Biodegradable Solid Waste
A-E-2.	Control of Emissions from Livestock Waste
P-B-5.	Control of Emissions from Outer Continental Shelf Exploration, Development, and Production
P-B-7.	Further Control of Emissions from Bulk Terminals
P-D-1.	Control of Fugitive Emissions from Publicly Owned Treatment Works
M-I-3.	Control of Emissions from Marine Vessel Tanks

Global Warming Gases

Table 9-4 presents a summary of the Basin's global-warming gas emissions compared to U.S. and global emissions. Emissions are normalized in terms of effective CO₂ equivalence by multiplying estimated emissions with global-warming potential factors. (These factors are calculated based on the capacity of the gas to absorb infrared radiation per unit of gas emission and its atmospheric lifetime set relative to a CO₂ value of 1.0). The normalization procedure provides for a better comparison of the significance of emission sources and would allow ranking of sources according to the severity of their impact on global warming.

TABLE 9-4
1987 South Coast Air Basin Emissions of Global Warming Gases

Global Warming Gas	Effective Carbon Dioxide Equivalence (x1000 tons/year)			S. Coast Fraction (percent)	
	South Coast ^a	U.S. ^b	Global ^c	U.S.	Global
carbon dioxide (CO ₂)	109,401	5,517,223	20,830,000	1.98%	0.53%
methane (CH ₄)	13,040	990,000	NA	1.32%	NA
CFC-11 (CFCl ₃)	14,226	348,000	2,425,098	4.09%	0.59%
CFC-12 (CF ₂ Cl ₂)	21,010	1,476,000	5,456,469	1.42%	0.39%
CFC-113 (C ₂ F ₃ Cl ₃)	9,211	210,000	NA	4.39%	NA
CFC-114 (C ₂ F ₄ Cl ₂)	172	80,000	NA	0.22%	NA
CFC-115 (C ₂ F ₅ Cl)	29	80,000	NA	0.04%	NA
Halon 1211 (CF ₂ ClBr)	276	12,500	NA	2.20%	NA
Halon 1301 (CF ₃ Br)	643	20,000	NA	3.22%	NA
HCFC-22 (CHF ₂ Cl)	864	89,000	NA	0.97%	NA
methyl chloroform (C ₂ H ₃ Cl ₃)	547	NA	NA	NA	NA
carbon tetrachloride (CCl ₄)	2	NA	NA	NA	NA
nitrous oxide (N ₂ O)	NA	NA	NA	NA	NA
TOTAL^d	169,423	8,822,723	28,711,567	1.92%	0.59%

- Notes:
- a) fossil fuel based emissions (CO₂ from California Energy Commission, 1990 and the rest from Alliance Technologies Corporation, 1990)
 - b) fossil fuel based emissions (U.S. Environmental Protection Agency, 1990)
 - c) fossil fuel based emissions (CO₂ from Carbon Dioxide Information Analysis Center, 1990 and CFCs from World Resources Institute, 1987)
 - d) Due to unavailable estimates, these totals are incomplete.
- NA) not available

The Basin has a very small fraction of the world's population, about less than one tenth of a percent and about four percent of U.S. population, but its release of CFCs and other global warming gases is significant. The Basin's CO₂ emissions account for about two percent of the national total and less than one percent of the world's total, while CFC-11 emissions account for four percent of the national and over one percent of the world's CFC-11.

There is more uncertainty in the national and global emission estimates than the Basin emission estimates: national and global estimates for several chemicals are not available and the net releases of CFCs were assumed to be equal to the consumption of CFCs for any given year.

Carbon Dioxide

Estimates shown in Table 9-4 above for source-specific CO₂ emissions are based on fuel consumption figures for 1987. Fuel-specific emission factors were developed and applied to these data to estimate CO₂ emissions.

Figure 9-1 shows the 1987 distribution of CO₂ emissions in the Basin by sector. Almost half of the CO₂ emitted is from the transportation sector. The second largest contributors are the industrial, utility, and residential sectors; contributing 20, 13, and 13 percent to total emissions, respectively.

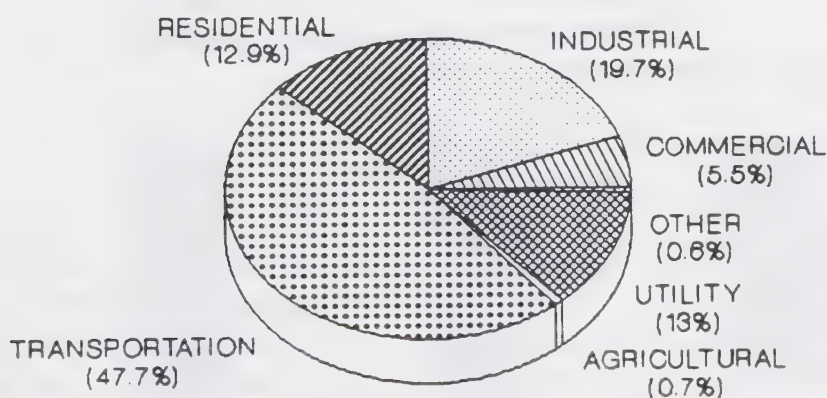


FIGURE 9-1
1987 Carbon Dioxide Sector Distribution

million tons. CO₂ emissions reductions due to the implementation of AQMP control measures in 2010 were estimated based on the following specific assumptions:

- o Residential natural gas use decreases by 20 percent, commercial natural/process gas use decreases by 20 percent, and residential and commercial electricity demand is reduced by 15 percent.
- o Passenger car and light-duty truck VMTs are reduced by 17 percent.
- o The mix of passenger cars, as detailed in the transportation measures section, is 17 percent electric vehicles, 33 percent alternate fuels (which includes ethanol, LPG, methanol, and natural gas), and 50 percent reformulated gasoline.

Using these assumptions, CO₂ emissions in 2010 from stationary sources are projected to be 69.0 million tons per year, and from transportation sources, an additional 35.5 million tons. Stationary and mobile source emissions are reduced by 17.8 and 43.6 percent, respectively. Assuming a 2010 population of 15.7 million, emissions are 6.65 tons per year per capita, a 30 percent reduction in per capita CO₂ emissions. This is graphically illustrated in Figure 9-2.

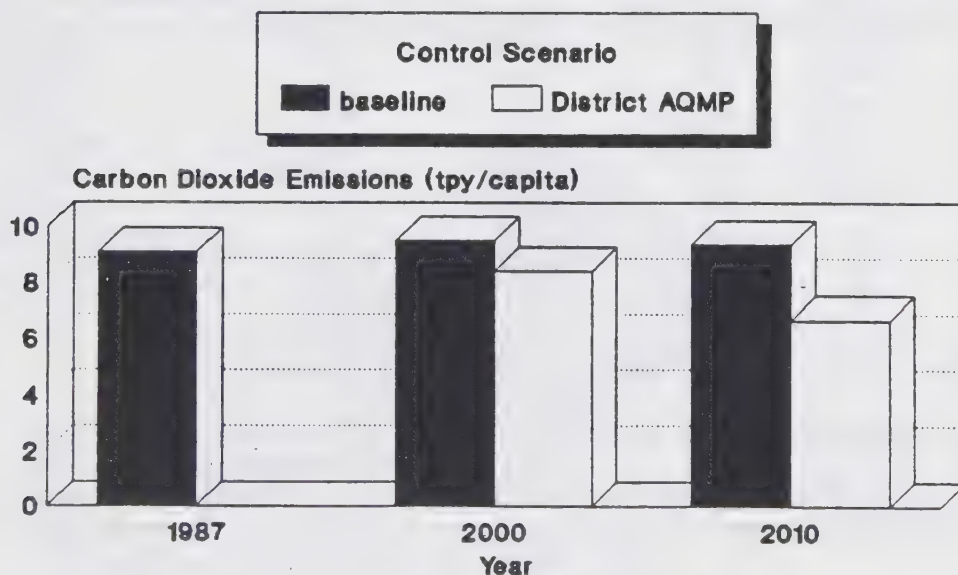


FIGURE 9-2
Per Capita Carbon Dioxide Emissions Profile

Methane

Methane emissions shown in Table 9-4 above were developed for fuel combustion-related emission sources, fuel production-related sources (natural gas pipeline transmission/distribution system leaks), livestock-related activities (emissions from cow manure piles and enteric fermentation in domesticated animals such as cows, pigs and sheep), and waste disposal landfills.

Figure 9-3 shows the 1987 distribution of methane emissions in the Basin by sector. Data shown in this figure are based on the emissions data developed for the Basin. Most of the methane emissions are associated with natural gas pipeline leaks and solid waste landfills. Together, these two sources account for about 75 percent of the total methane emitted in the Basin.

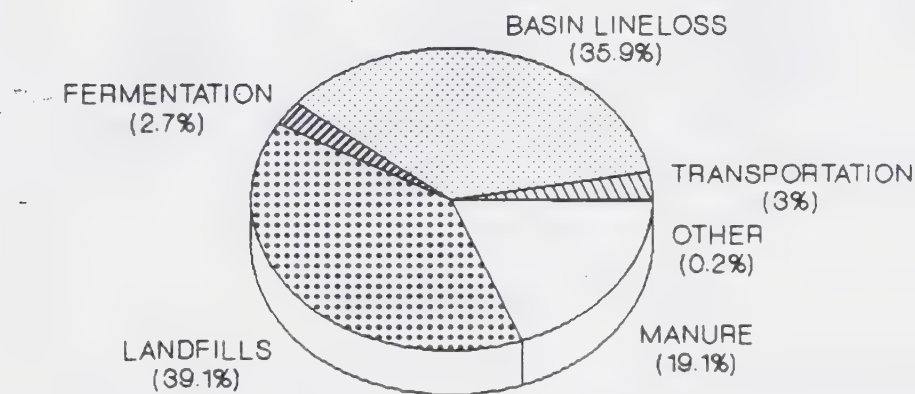


FIGURE 9-3
1987 Methane Sector Distribution

As shown in Figure 9-3, natural gas pipeline leaks are the second largest contributor of methane emissions in the Basin. A list of control measures to control fugitive emissions from pipeline leaks has been developed. The list includes an enhanced inspection and maintenance program, installation of BARCT or leakless equipment, and replacement of equipment found repeatedly out of compliance with specified maximum leak rates.

From the transportation sector, methane emissions will be reduced as electric vehicles penetrate the in-use vehicle fleet. (About 10 to 20 percent

of the hydrocarbon exhaust from a gasoline-powered vehicle is methane.) Assuming full implementation of District rules limiting emissions from landfills and natural gas pipeline leaks, methane emissions will be reduced by 41 percent in the year 2010 (Figure 9-4).

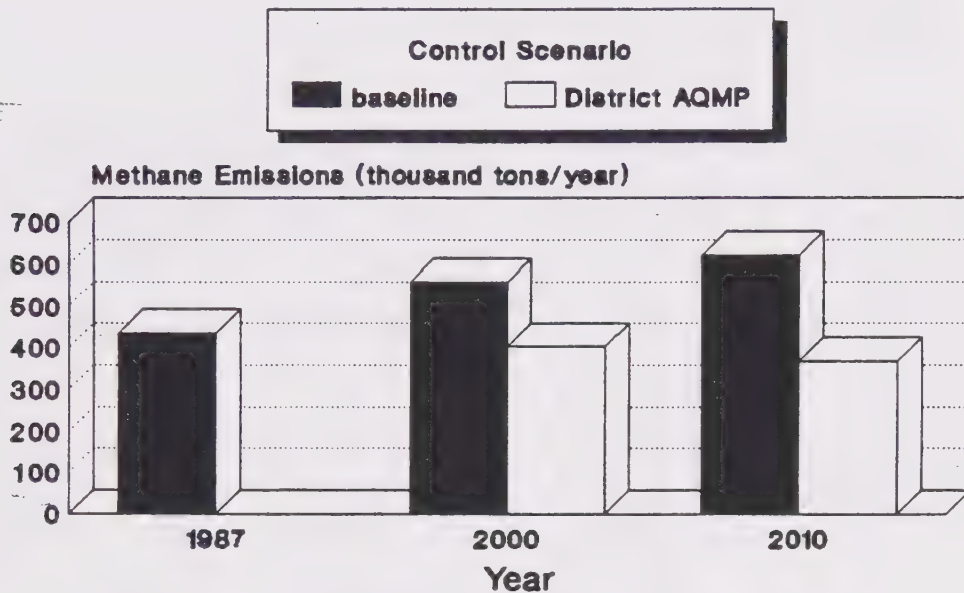


FIGURE 9-4
Methane Emissions Profile

Ozone-Depleting Gases

A summary of the Basin's 1987 emissions of ozone-depleting compounds is shown in Table 9-5. CFCs are among the most potentially significant contributors to global climate change processes due to their contribution to both global warming and ozone depletion. These compounds have lifetimes that can last for tens of years; therefore, past emissions, as well as current and future emissions, will have impacts on global warming and ozone depletion.

TABLE 9-5
1987 South Coast Air Basin Emissions of Ozone-Depleting Compounds

Ozone Depleting Compound	Ozone Depleting Factor ^a	Estimated Emissions (tons/year)	Effective Emissions ^b (tons/year)	Percentage (percent)
CFC-11 (CFCl ₃)	1.00	3,557	3,557	33.38%
CFC-12 (CF ₂ Cl ₂)	1.00	2,334	2,334	21.91%
CFC-113 (C ₂ F ₃ Cl ₃)	0.80	3,071	2,456	23.06%
CFC-114 (C ₂ F ₄ Cl ₂)	1.00	22	22	0.20%
CFC-115 (C ₂ F ₅ Cl)	0.60	2	1	0.01%
Halon 1211 (CF ₂ ClBr)	3.00	55	165	1.55%
Halon 1301 (CF ₃ Br)	10.00	129	1,286	12.07%
HCFC-22 (CHF ₂ Cl)	0.05	864	43	0.41%
methyl chloroform (C ₂ H ₃ Cl ₃)	0.10	7,813	781	7.33%
carbon tetrachloride (CCl ₄)	1.10	7	7	0.07%
TOTAL		17,853	10,653	100.00%

Reference: Alliance Technologies Corporation, 1990

- a) The ozone-depleting factor expresses the ozone-depleting potential of a gas in the stratosphere in terms of CFC-11. The higher the value, the greater is the potential to destroy stratospheric ozone.
- b) Effective emissions = estimated emissions x ozone-depleting factor.

As shown in Table 9-5, CFC-11 and CFC-12 are among the most significant species emitted in the Basin. Together, these two species, which are used primarily in air-conditioning and refrigeration systems, account for 55 percent of the total CFC emissions in the Basin. CFC-113 emissions accounted for 23 percent of total emissions in 1987. CFC-113 is primarily used as a solvent in transportation equipment manufacture and electronics equipment manufacture and maintenance. Although the magnitude of the CFC-113 emissions is significant, its global-warming and ozone-depleting potentials are much less than the potentials for CFC-11 or CFC-12.

Emissions of CFCs and other halogenated compounds shown in Tables 9-4 and 9-5 were developed from residential, commercial, and industrial air-conditioning systems, foreign and domestic automobile air-conditioning systems, industrial and retail refrigeration systems, polyurethane and non-polyurethane foam use, sterilization equipment, inhalant drug delivery

systems, and other sources. Emissions were estimated by multiplying an emissions factor by an activity factor. Activity factors include such parameters as the number of refrigerators and vehicles in a county. In some cases, existing state or national estimates were apportioned to the county level using surrogate parameters, such as county population or industrial employment statistics.

Figure 9-5 illustrates the 1987 distribution of CFC emissions by sector. The most significant contributor to total emissions is the industrial sector, which is composed primarily of solvent use sources, as well as some refrigeration activities.

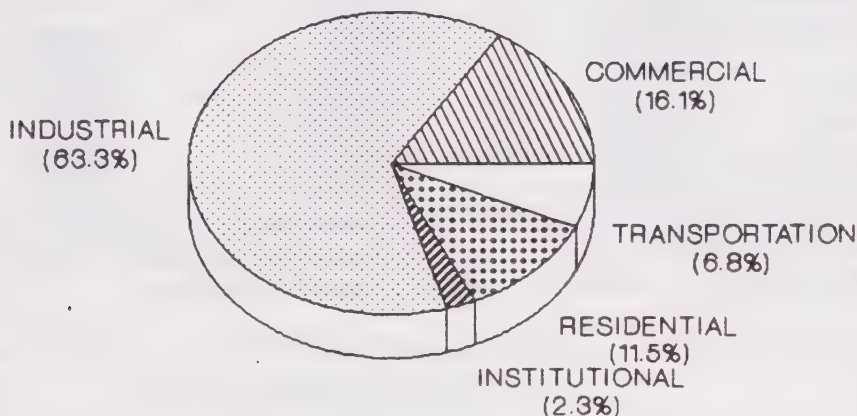


FIGURE 9-5
1987 CFC Sector Distribution

The effect of the District's policy on the Basin's CFCs emissions is shown in Figure 9-6. Emission reductions for the years 2000 and 2010 are compared with the projected baseline emissions for the same years as estimated from the 1987 emissions. The baseline projections represent the emissions anticipated to occur in the absence of regulatory intervention. Due to the phaseout schedule as contained in the District's Policy and the effect of the foam blowing and proposed recycling rules, use of CFCs will not increase as projected under the no controls scenario. A 69 percent reduction in the year 2000 and an 86 percent reduction in 2010 are anticipated to occur.

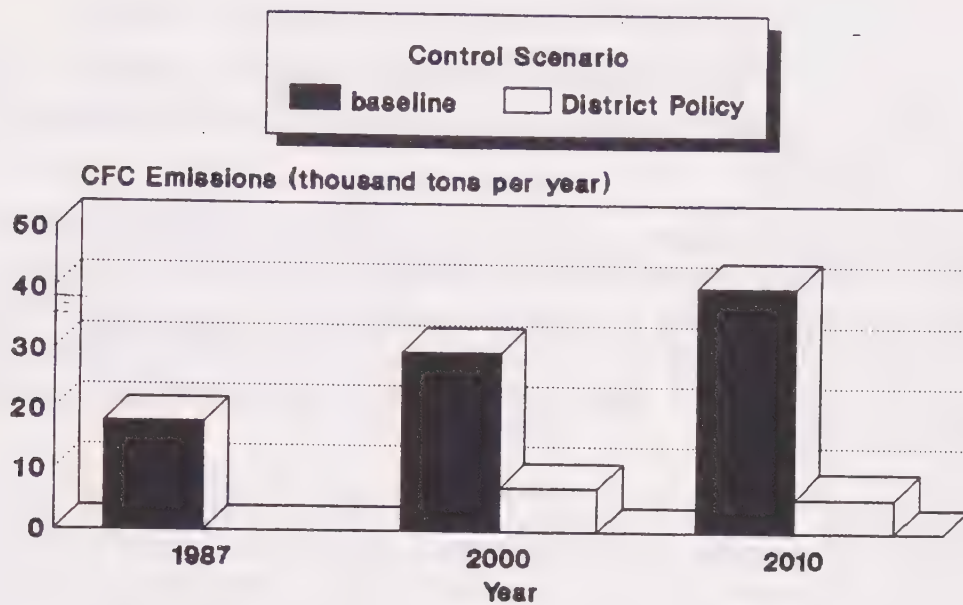


FIGURE 9-6
CFC Emissions Profile

OTHER IMPACTS OF AQMP CONTROL MEASURES

A summary listing of Tier I control measures proposed in Chapter 4 and their impact on global warming and stratospheric ozone depletion is presented in Table 9-6.

Most of the control measures will either have a positive impact (decrease emissions) or have no impact on ozone depletion and global warming. In addition, surface-level ozone is suspected to contribute to global warming in that it has the ability to absorb heat and trap it near the earth's surface. As such, control measures to reduce anthropogenic ozone emissions could reduce global warming.

However, some control measures could increase emissions of these compounds. For example, one of the primary control measures proposed to reduce ROG emissions is the reformulation of coatings and solvents with less photochemically reactive solvents. Depending on the type, quantity and application of the substitute solvents, ozone-depleting gas emissions may or may not be increased. As part of the rulemaking process, an assessment of these impacts will be made. Potential trade-offs may have to be addressed between near-term public health improvements in the Basin and long-term global protection.

TABLE 9-6

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

TIER I. SUBGROUP A: SURFACE COATING AND SOLVENT USE

	CONTROL CATEGORY	CONTROL METHOD	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
A-A-1.	Arch. Coating	user emission charges	decrease	decrease
A-A-2.	Surface Coating	improve procedures solvent reformulation	decrease unknown ⁽¹⁾	decrease increase ⁽¹⁾
A-A-3.	Domestic Products	alternative application ban aerosols reformulation	decrease decrease unknown ⁽¹⁾	decrease decrease increase ⁽¹⁾
A-A-4.	Solvent Waste	outreach program proper disposal waste minimization	decrease decrease decrease	decrease decrease decrease
P-A-1.	Wood Flatstock Coating	alternative coating methods coating reformulation eliminate exemptions recordkeeping	decrease unknown ⁽¹⁾ unknown ⁽²⁾ decrease	decrease increase ⁽¹⁾ unknown ⁽²⁾ decrease
P-A-2.	Auto. Assembly Coating	add-on control equipment evening shift solvent reformulation transfer efficiency	decrease ⁽³⁾ decrease ⁽⁴⁾ unknown ⁽¹⁾ decrease ⁽³⁾	no impact no impact increase ⁽¹⁾ decrease
P-A-3.	Paper, Fabric, and Film Coating	coating reformulation recordkeeping	unknown ⁽¹⁾ decrease	increase ⁽¹⁾ decrease
P-A-4.	Metal Cleaning and Degreasing	add-on control equipment eliminate exemptions increase freeboard ratio outreach program	decrease ⁽³⁾ decrease decrease decrease	decrease decrease decrease decrease
P-A-5.	Perchloroethylene Dry Cleaning	eliminate exemptions replace transfer system	decrease decrease ⁽³⁾	decrease decrease
P-A-6.	Electronic Comp. Manufacturing	add-on control equipment housekeeping positive photoresist	decrease ⁽³⁾ decrease no impact	decrease decrease no impact

TABLE 9-6 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

TIER I. SUBGROUP B: PETROLEUM AND GAS PRODUCTION

CONTROL CATEGORY		IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
A-B-1.	Gasoline Transfer: Phase I vapor recovery	no impact	no impact
A-B-2.	Gasoline Transfer: Phase II vapor recovery	no impact	no impact
A-B-3.	Pleasure Boat Fueling	no impact	no impact
A-B-4.	Organic Liquid Transfer	decrease ⁽⁵⁾	no impact
A-B-5.	Gasoline Dispensing Facility	no impact	no impact
A-B-6.	Utility Engine Fueling	no impact	no impact
A-B-7.	Gasoline Transfer: spillage control	no impact	no impact
A-B-8.	Natural Gas Transmission/Distribution Line	decrease	no impact
A-B-9.	Process Drain	decrease	decrease
P-B-1.	Fluid Catalytic Cracking Unit (SO _x)	increase ⁽⁶⁾	no impact
P-B-2.	Fluid Catalytic Cracking Unit (NO _x)	decrease ⁽³⁾	decrease
P-B-3.	Gas-Fired Refinery Process Heater	no impact ⁽³⁾	no impact
P-B-4.	Fluid Catalytic Cracking Unit (PM ₁₀)	increase ⁽⁶⁾	no impact
P-B-5.	OCS Exploration, Development, and Production	unknown ⁽⁷⁾	unknown ⁽⁷⁾
P-B-6.	Refinery Flare	no impact	no impact
P-B-7.	Bulk Terminal	decrease ⁽⁵⁾	no impact

TIER I. SUBGROUP C: COMMERCIAL AND INDUSTRIAL PROCESS

CONTROL CATEGORY		IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
A-C-1.	Large Commercial Bakery	increase ⁽⁸⁾	no impact
A-C-2.	Commercial Charbroiling	increase ⁽⁸⁾	no impact
A-C-3.	Laboratory Fume Hood	decrease	decrease
A-C-4.	Deep Fat Frying	increase ⁽⁸⁾	no impact
A-C-5.	Miscellaneous Combustion Sources	decrease	no impact
A-C-6.	Internal Combustion Engine (<50 HP)	decrease ⁽³⁾	no impact
P-C-1.	Rubber Products	no impact	no impact
P-C-2.	Afterburner	increase ⁽⁸⁾	no impact
P-C-3.	Woodworking Operation	no impact	no impact
P-C-4.	Small Boiler/Process Heater	no impact	no impact
P-C-5.	Metal Melting Furnace	no impact	no impact
P-C-6.	Curing/Drying Oven	no impact	no impact
P-C-7.	Glass Melting Furnace	no impact	no impact
P-C-8.	Cement Kiln	no impact	no impact

TABLE 9-6 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

TIER I. SUBGROUP D: RESIDENTIAL AND PUBLIC SECTOR

	CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
A-D-1.	Biodegradable Solid Waste	decrease	decrease
A-D-2.	Swimming Pool Heating	decrease	no impact
A-D-3.	Residential/Commercial Water Heating	decrease	no impact
P-D-1.	Publicly Owned Treatment Works (POTW)	no impact	no impact

TIER I. SUBGROUP E: AGRICULTURAL PROCESS

	CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
A-E-1.	Pesticide Application	no impact	no impact
A-E-2.	Livestock Waste	decrease ⁽⁹⁾	no impact
A-E-3.	Agricultural Dust	no impact	no impact

TIER I. SUBGROUP F: OTHERS

	CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
A-F-1.	Best Available Retrofit Control Technology	unknown ⁽⁷⁾	unknown ⁽⁷⁾
A-F-2.	Construction Site	no impact ⁽¹⁰⁾	no impact
A-F-3.	Ammonia Emissions	unknown ⁽⁷⁾	unknown ⁽⁷⁾
A-F-4.	Building Construction	unknown ⁽¹⁾	unknown ⁽¹⁾
A-F-5.	Wind Erosion (PM ₁₀)	no impact	no impact
P-F-1.	Fuel Oil and Fossil Fuel: phaseout	decrease	no impact
P-F-2.	Emission Minimization Management Plan	unknown ⁽⁷⁾	unknown ⁽⁷⁾
P-F-3.	Marketable Permit Program	decrease	no impact

TABLE 9-6 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

TIER I. SUBGROUP G: MOTOR VEHICLES

	CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
M-G-1.	Zero Emission Urban Bus Implementation	decrease ⁽³⁾	no impact
M-G-2.	Clean Fuel Retrofit of Transit Bus	decrease	no impact
M-G-3.	Radial Tires on Light-Duty Vehicle	decrease	no impact
M-G-4.	Clean Fuel in New Fleet Vehicle	decrease	no impact
M-G-5.	Motor Vehicle Buyback Program	decrease	no impact
M-G-6.	Dealership Cold Start	decrease	no impact
M-G-7.	Curb Idling	decrease	no impact
M-G-8.	Aerodynamic Device for Truck	decrease	no impact
M-G-9.	Advertising Vehicle	decrease	no impact
M-G-10.	Refrigerated Transportation	decrease	no impact
M-G-11.	Inspection and Maintenance Program Enhancement	decrease	no impact
M-G-12.	Oxygenated Fuels Program	unknown	no impact

TIER I. SUBGROUP H: TRANSPORTATION SYSTEM AND LAND USE

	CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
M-H-1.	Environmental Review Program	unknown	unknown
M-H-2.	Trip Reduction	decrease	no impact
M-H-3.	Supplemental Development Standard	unknown	unknown
M-H-4.	Special Activity Center	decrease	no impact
M-H-5.	Enhanced Regulation XV	decrease	no impact
M-H-6.	Truck Program	decrease	no impact
M-H-7.	Registration Program	decrease	no impact
M-H-9.	Sensitive Receptor Certification	unknown	unknown

TABLE 9-6 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

TIER I. SUBGROUP I: OFF ROAD VEHICLE

CONTROL CATEGORY		IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
M-I-1.	Ship Berthing	decrease (3)	no impact
M-I-2.	Jet Aircraft Engine	decrease	no impact
M-I-3.	Marine Vessel Tank	decrease (5)	no impact
M-I-4.	Marine Diesel Operation	decrease	no impact
M-I-5.	Sulfur Content of Marine Fuel Oil	decrease (3)	no impact
M-I-6.	Military Aircraft	decrease	no impact
M-I-7.	Leaf Blower	decrease	no impact
M-I-8.	Construction and Farm Equipment	decrease	no impact

TIER I. ENERGY CONSERVATION

CONTROL CATEGORY	CONTROL METHOD	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
E-C-1A.	Commercial Sector Electricity Savings	decrease (3)	decrease
E-C-1B.	Commercial Sector Natural Gas Savings	decrease (3)	decrease
E-C-2A.	Industrial Sector Electricity Savings	decrease (3)	decrease
E-C-2B.	Industrial Sector Natural Gas Savings	decrease (3)	decrease
E-C-2C.	Industrial Sector Glass Recycling	decrease (3)	decrease
E-C-2D.	Industrial Sector Paper Recycling	decrease (3)	decrease
E-C-3.	Local Gov't Sector Energy Conservation	decrease (3)	decrease
E-D-1A.	Residential Sector Electricity Savings	decrease (3)	decrease
E-D-1B.	Residential Sector Natural Gas Savings	decrease (3)	decrease

TABLE 9-6 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

TIER II & III. SURFACE COATING AND SOLVENT USE

CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
Consumer Products	unknown ⁽¹⁰⁾	unknown ⁽¹⁰⁾
High-Transfer Efficiency/Robotic Application	decrease	decrease
Nonsolvent-Based Coating Reformulation	decrease	decrease
Outreach and Monitoring Program	unknown ⁽¹⁾	unknown ⁽¹⁾

TIER II & III. STATIONARY SOURCES

CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
Paved Roads	unknown ⁽¹⁰⁾	no impact
Emission Charge	unknown ⁽¹⁰⁾	no impact
Export Fee on Petroleum Products	unknown ⁽¹⁰⁾	no impact
Best Available Retrofit Control Technology (BARCT)	decrease	decrease

TIER II & III. TRANSPORTATION MEASURES

CONTROL CATEGORY	IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
Low-Emission Freight Vehicle	decrease	no impact
Low-Emission Light and Medium Duty Vehicle	decrease	no impact
Low-Emission Transit Bus	decrease	no impact
Stricter Emissions for Off-Road Vehicle	decrease	no impact

TABLE 9-6 (Continued)

Summary of the Impacts of District AQMP Control Measures on
Global Warming and Ozone Depletion

CONTINGENCY MEASURES

CONTROL CATEGORY		IMPACT ON GL. WARM.	IMPACT ON OZ. DEPL.
T-1.	Additional Tax on Motor Vehicle Gasoline and Diesel	unknown ⁽¹⁰⁾	no impact
T-2.	Limits on Vehicle Registration	decrease	no impact
T-3.	Emission Charge on Parking Lots	unknown ⁽¹⁰⁾	no impact
T-4.	Emission Charge on Vehicle Use	unknown ⁽¹⁰⁾	no impact
T-5.	Reduce Vehicle Miles Travelled to 1985 Level	decrease	no impact
T-7.	Time and Place Control Measure	decrease	no impact
T-8.	More Stringent Emission Standard	decrease	no impact
T-9.	Emission Charge on Stationary Sources (> 10 tpy)	unknown ⁽¹⁰⁾	no impact
T-10.	Zero Emission Vehicles	decrease	no impact

NOTES

1. Potential impacts are difficult to predict and quantify since information on the nature of reformulated solvents, quantities, and sources are not available.
2. This control approach may encourage more facilities to use exempt, chlorinated solvents.
3. This control method will decrease overall emissions of carbon dioxide, surface-level ozone, and nitrogen oxides; however, the associated energy requirements may increase emissions of these compounds at power plants.
4. This control method may decrease surface-level ozone formation due to the lack of sunlight.
5. This control method would reduce fugitive methane emissions.
6. Hydrotreating the feed stream requires large volumes of hydrogen. Hydrogen production may increase carbon dioxide and unreacted methane emissions.
7. Potential impacts are difficult to predict and quantify since types and combinations of pollutants, sources, control technologies, operating assumptions, etc., are abundant.
8. The use of combustion devices to control organic emissions will increase carbon dioxide emissions as products.
9. Decreased composting may reduce methane emissions.
10. Emission fees would not guarantee emission reductions.

X

ENERGY





From left to right: Carlos Flores, Edward Ousepyan, Jason Castro, Candy Lopez, Killian Deleon

Sprucing Up The Neighborhood

Clean and Green is a year-round program initiated by Mayor Tom Bradley that relies on a force of committed junior high age kids to improve the Los Angeles urban environment. In one year, about 1,000 students participate in the six week program. Paid a minimum wage, they paint over grafitti, recycle trash and plant trees. They also take part in a field study program in which they learn about local and global environmental issues.

CHAPTER 10

ENERGY

Introduction

Clean Fuels

Energy Conservation/Efficiency

Energy Demand and Supply Impact Analysis

INTRODUCTION

Energy use contributes significantly to emissions of criteria pollutants as well as global warming gases (i.e., CO₂, CH₄). In 1987, approximately 80% of all criteria emissions were related to energy use. In terms of global warming gases, approximately 70% of the emissions are energy related.

The District, in the pursuit of achieving all criteria pollutant air quality standards and reducing adverse global impacts, is committed to reduce energy-related emissions by implementing two major policies:

- o Promoting clean energy
- o Reducing the demand for energy

This AQMP calls for a significant increase in the use of alternative, cleaner types of energy, relative to the traditional petroleum-based fuels. This policy will have double benefits: reduction in emissions and reduced dependency on petroleum-based fuels.

With the projected increase in population, it is also imperative to advocate the implementation of policies leading to energy efficiency. These conservation policies, as reflected in this AQMP, will help reduce the demand for energy and thereby reduce the associated emissions.

In order to address some of the concerns raised during the adoption of the 1989 AQMP, the District Governing Board directed staff to form an interagency Energy Working Group to examine the energy issues raised in the 1989 Plan, to reach technical consensus on how to analyze the energy impacts of air quality strategies, and to provide input to the 1991 AQMP. The task was successfully completed. The Energy Working Group Steering Committee also discussed energy-related air quality issues and sought consensus whenever possible.

CLEAN FUELS

This AQMP, similar to the 1989 AQMP relies upon the characteristics of alternative clean fuels to reduce emissions and to provide fuel diversity. At this stage electricity, ethanol, geothermal, LPG, methanol, natural gas, solar, and wind are considered clean fuels of the near future for various applications.

Stationary Sources

Alternative fuels can play an important role in reducing emissions from stationary sources of combustion. Specifically, as shown in Chapter 4, alternative fuels are proposed for reducing emissions from petroleum and gas production; industrial and commercial processes; and residential and public sectors. Specific alternative fuel proposals include the phase-out of fuel oil and solid fuel, use of electricity, natural gas, and solar to be implemented as Tier I control measures.

Mobile Sources

Alternative fuels are expected to play a very significant role in reducing emissions from mobile sources. This is due to the fact that mobile source emissions are due to both combustion and evaporation. The use of alternative fuels will lead to reductions in combustion and evaporation emissions. Electricity, ethanol, LPG, methanol, and natural gas are expected to play key roles in reducing emissions in various mobile source applications.

The on-road mobile source control strategy for light and medium duty vehicles is primarily based on the September 1990 ARB Low-Emission Vehicles and Clean fuels rulemaking. This rulemaking included:

- very stringent emission standards,
- mandatory sale of zero-emission vehicles,

- the use of vehicles powered by alternative fuels, and
- the requirement for widespread availability of alternative fuels.

The Plan builds upon the adopted ARB regulation by extrapolating the requirements to the year 2010. The ARB and District have estimated the potential alternate-fueled vehicle penetration for the year 2010 based on today's understanding of technological feasibility of these alternate fuels and their availability. The VMT penetration assumptions and the estimated percent of new vehicle sales corresponding to the VMT penetration for the year 2010 are shown in Tables 10-1 and 10-2. In addition, the District has established an interim market penetration goal of 200,000 electric vehicles by the year 2000.

The off-road mobile source control strategy proposes to set very stringent emission standards, some of which may only be met by using alternate clean fuels in combination with advanced emission control technologies.

The District will continue to seek further technological, financial, and incentive breakthroughs to advance the use of alternate clean fuels. These further advancements will be reflected in future updates of the AQMP through planning assumptions incorporating higher penetration rates.

TABLE 10-1
Motor Vehicle VMT Penetration Assumptions for 2010
(percent of all miles driven)

Vehicle Class	Electric	Alternate Fuels *	Reformulated Gasoline	Diesel
Passenger Cars	17	33	50	0
Light-Duty Vehicles	9	38	53	0
Medium-Duty Vehicles	0	40	57	3
Heavy-Duty Vehicles	0	24	29	47
Urban Buses	30	70	0	0
Locomotives	90	0	0	10

* Likely alternative fuels include ethanol, LPG, methanol, and natural gas.

TABLE 10-2
Estimated Percent of New Vehicle Sales for 2010*

Vehicle Class	Electric	Alternate Fuels**	Reformulated Gasoline	Diesel
Passenger Cars	50	25	25	0
Light-Duty Vehicles	35	32.5	32.5	0
Medium-Duty Vehicles	0	50	50	-
Heavy-Duty Vehicles	0	50	50	-
Urban Buses	30	70	0	0

* The data in the table reflect sales assumptions required to achieve fleet penetration goals in Table 10-1. Actual sales forecast can be further refined by conducting market penetration analysis utilizing specific vehicle and fuel cost estimates.

** Likely alternative fuels include ethanol, LPG, methanol, and natural gas.

Comparison with the 1989 AQMP

The District continues to support a vigorous clean fuels program. While being fuel neutral, the characteristics of alternate clean fuels in combination with emission control technology are used as benchmarks for setting stringent emission limits. These emission limits continue at the stringent levels set in the 1989 AQMP. However, advancements in adoption of regulations and understanding of technological breakthroughs have resulted in changes to the projections of the utilization of various types of alternate clean fuel in the future to attain federal ambient air quality standards.

The District recognizes that it is important to consider the full fuel cycle when evaluating the potential impact of cleaner burning fuels on air quality. The atmosphere recognizes emissions from all sources, including fuel generation, distribution, refueling, spillage, evaporation, resting and running losses, as well as tail-pipe emissions. Clearly, economics, future technological developments, and future regulatory development will shape the final distribution of clean fuels to achieve air quality targets.

ENERGY CONSERVATION/EFFICIENCY

Energy conservation provides one of the major avenues of achieving clean air, providing resource diversity, and energy independence. Specifically, in terms of the benefits to the South Coast Air Basin, energy conservation can:

- o reduce emissions from combustion sources,
- o provide a mechanism to reallocate energy resources to support other air quality strategies such as the promotion of electric vehicles, and
- o reduce emissions of global warming gases.

A set of conservation targets have been set in the AQMP for electricity and natural gas. These targets are presented in tables 10-3 and 10-4.

These proposed conservation targets are additional savings beyond those levels expected to be achieved from the utility programs approved by PUC prior to November 1989 and by building and appliance standards adopted prior to October 1990. Approximately one half of the electricity savings proposed here have also been proposed by the CEC in ER-90. Significant increased natural gas savings have also been approved in the CPUC Collaborative and the 1991 CEC Building Standards.

TABLE 10-3
Electricity Conservation Targets
(Percent)

Sector	1994	2000	2010
Residential	2	10	15
Commercial	3	15	15
Industrial	1	5	5

TABLE 10-4
Natural Gas Conservation Targets^{*}
(Percent)

Sector	1994	2000	2010
Residential	5	12	20
Commercial	10	**	20
Industrial	**	**	**

* Please see page 10-7 for the derivations and calculations.

** To be determined

Comparison with the 1989 AQMP

The energy conservation target for the 1989 AQMP was a 30 percent reduction goal in both electricity and natural gas consumption by the year 2010. These targets applied to both residential and commercial sectors. The relatively lower targets for residential electricity and natural gas conservation in the 1991 AQMP are based upon a detailed end-use technical and economic potential analysis completed by the CEC staff for the EWG Conservation subgroup. Economic and technical potential was developed through analysis of the current and future market saturation of over 12 key efficiency measures for five different segments of the residential market. The commercial targets were based upon a less rigorous literature search performed by a consultant to the SCAQMD.

The initial results for natural gas economic potential indicated a 39% reduction potential by 2010. This potential was reduced to 28% to take into account program delivery costs and uncertainty regarding the practicality and cost-effectiveness of high-efficiency water heaters. CEC staff recommended further reducing the target to 20% as a measure of the fact that consumers do not always use lifecycle cost analysis to make appliance purchase decisions, and that conservation programs cannot reach all households. The District believes the 20 percent goal is conservative, because the impact of emerging technologies not yet commercially available have not been included in the analysis.

The 1991 AQMP also includes an additional target for electricity savings in the industrial sector. This target is consistent with the utilities' estimates filed before the CEC for the latest statewide biennial energy planning. Insufficient technical information prevents the proposal of an overall industrial natural gas conservation target, although individual measures pertaining to reducing natural gas consumption in the industrial sector are included in the AQMP.

Achieving Conservation Targets

The energy savings proposed in the 1991 AQMP are expected to be achieved through planned (but not yet authorized) utility programs, revisions to building standards, and local government retrofit and other programs. Specific implementation programs and responsibilities have, however, not yet been defined. Toward this end, and to assess the feasibility of higher or lower targets, the District and the CEC have agreed to cofund a two-phase energy conservation study to identify societally cost-effective programs for both natural gas and electricity conservation, using appropriate cost-effectiveness criteria. The first phase of the contract will address the residential sector, (due in late 1991) and the second phase, the commercial sector (due in mid 1992).

Based upon the results of this study, and other relevant work,¹ the District intends to revisit these targets in 1992. If revised targets are appropriate, a formal resolution will be presented to the Board by the District staff.

¹The CPUC is currently conducting a study of actual savings from current utility programs, and Southern California Gas Co has initiated a conservation potential evaluation.

ENERGY DEMAND AND SUPPLY IMPACTS ANALYSIS

Control measures proposed in the 1991 AQMP will not only reduce emissions from energy sources, but may also affect the pattern of energy use. Detailed discussion on the analysis assumptions, methodology, and results is provided in Appendix IV-D: Energy Conservation Measures and Energy Analysis for Control Strategies, which is coauthored by District and CEC staff. These results are summarized below.

Energy Scenarios Analyzed

Nearly all control measures could have an impact on future energy use. For the purpose of impact analysis, control measures are categorized as follows:

- o Energy Conservation (Demand-Side Management): This scenario accounts for reductions in electricity and natural gas consumption consistent with the conservation targets proposed by the 1991 AQMP.
- o Stationary Controls: This scenario accounts for changes in energy consumption due to changes in energy use, potential use of add-on controls, and choice of compliance strategies.
- o Motor Vehicles: This scenario accounts for a reduction in petroleum fuel demand due to transportation control management (TCM), as well as the introduction of electric and alternative-fuel vehicles.
- o Combined Impact: This scenario accounts for the net effect of the above three scenarios.

A detailed description and list of measures included in each scenario are provided in Appendix IV-D. It should be noted that in order to perform the impact analysis, assumptions have to be made for the regulated community on what compliance strategies will be chosen. Therefore, the impact analysis represents the best current examination of future emission control technologies and compliance strategies.

Impacts on Electricity Demand and Supply

Table 10-5 and Figure 10-1 show the expected electricity demand due to implementation of the AQMP. As noted in Table 10-5, regional growth alone (without the AQMP) accounts for an increase in electricity consumption and peak demand by about 50 percent and 65 percent, respectively between 1987 and 2010. When implemented in its entirety by 2010, the Plan could decrease electricity consumption from the projected baseline of 149,000 GWh by about 7,500 gigawatt hours (GWh) (5 percent) and decrease peak demand from the projected baseline of 34,200 MW by 3,400 megawatts (MW) (10 percent). As a result, the net growth between 1987 and 2010 due to the 1991 AQMP would be reduced to 45 percent (vs. 50 percent) and 50 percent (vs. 65 percent) in electricity consumption and peak demand, respectively.

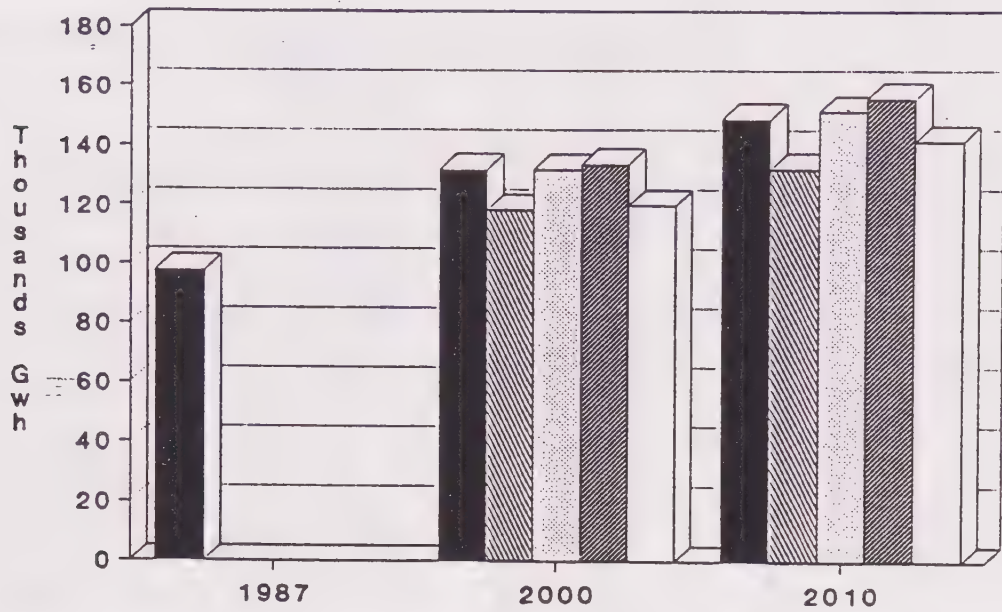
Table 10-6 presents the impacts of the Plan on electric generation capacity based on results obtained using the CEC's resource planning assumptions simulated with the ELFIN energy cost production model. These assumptions are consistent with the CEC Electricity Report-90 (ER-90) policy decisions, which provide the starting point for the PUC's Biennial Resource Plan Update. The net decrease in demand due to implementation of the Plan could reduce supply resources by about 600 megawatts from CEC's projected 2010 resource plan (41,000 MW). The differences between peak capacity demand and energy resources need (Tables 10-5 and 10-6) are attributed to power transmission and distribution losses, the reserve margin needed to ensure a reliable power supply, economic considerations in power plant operations, changes in the system load shape, and inclusion of uncommitted energy conservation in the baseline resources.

The estimated impact on power plant emissions resulting from the decrease in the power generation need of the 1991 Plan control measures is about 2 tons/day and 6 tons/day of NO_x in the years 2000 and 2010, respectively.

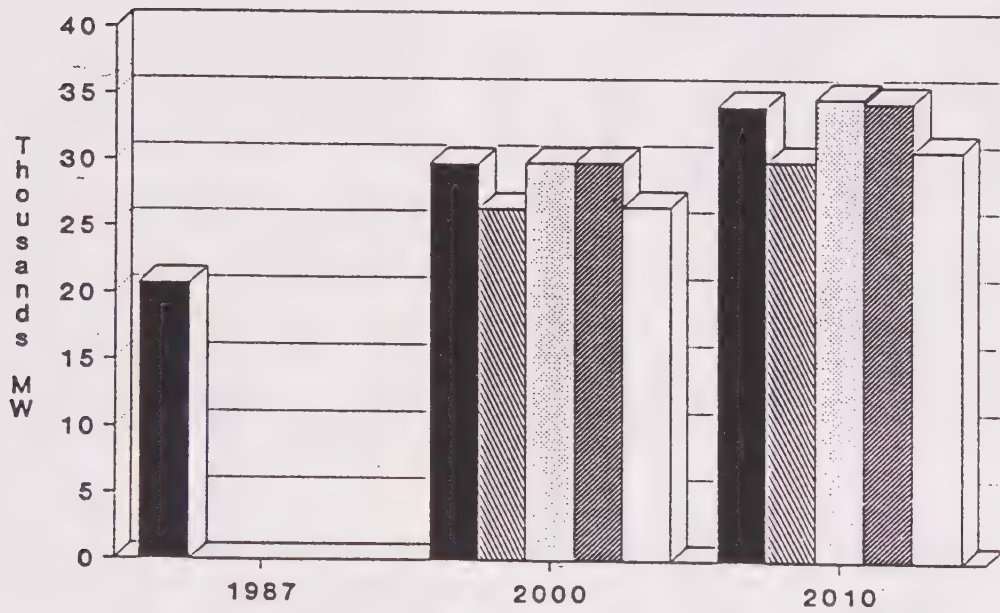
TABLE 10-5
Summary of Electricity Consumption and Peak Demand Impacts
1991 AQMP

Electric Energy	1987		2000 ^(a)		2010 ^(a)	
	GWh	MW	GWh(%)	MW(%)	GWh(%)	MW(%)
Baseline Forecast	97,800	20,700	132,000(100)	29,800(100)	149,000(100)	34,200(100)
Scenario Changes:						
Energy Conservation			-13,700(-10)	-3,400(-11)	-16,800(-11)	-4,200(-12)
Stationary Controls			-150(0)	+50(0)	+2,400(+2)	+560(+2)
Motor Vehicle Fuels			+1,700(+1)	+90(0)	+6,900(+5)	+270(+1)
Combined Impact			-12,200(-9)	-3,250(-11)	-7,500(-5)	-3,400(-10)

(a) Actual forecast years : 2001 and 2009.



Electric Energy Impact of the 1991 AQMP



Electricity Peak Demand of the 1991 AQMP

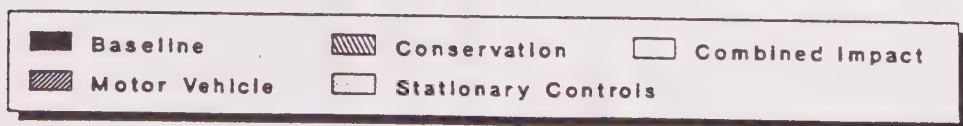


FIGURE 10-1

TABLE 10-6
Impact of Electric Generation Requirements
1991 AQMP

Resources Need	1987 ^(a) (MW)	2000 ^(a) (MW) (%)		2010 ^(a) (MW) (%)	
Baseline ^(b)	29,700	37,700	100	41,000	100
Generation	29,700	34,200		37,200	
Conservation	0	3,500		3,800	
Scenario Changes ^(c)					
Energy Conservation		-1,200	-3	-2,200	-5
Stationary Controls		+400	+1	+800	+2
Motor Vehicle Fuels		+80	0	+400	+1
Combined Impact		-800	-2	-600	-1

(a) Actual forecast years are 1988, 2001 and 2009.

(b) The baseline resources need for 2000 and 2010 include the uncommitted demand-side resources in the ER-90 supply plan. In 2000, there is approximately 2000 MW of conservation, while in 2010 there are about 2200 MW.

(c) Scenario resource need changes differ from peak demand changes from Table 10-5 due to economic considerations in capacity expansion plans, changes in load shape, inclusion of some conservation in the baseline, transmission and distribution losses, and accounting for a reliable reserve margin.

Impacts on Fossil Fuel Demand and Supply

The changes in fossil fuel demand as a result of implementing the Plan are shown in Table 10-7. The impact analysis on fuel demand includes natural gas, fuel oil, diesel, gasoline, methanol, and liquefied petroleum gas (LPG). The ranges of the fuel demand reflect the potential fuel penetration of alternative fuel vehicles as defined in Table 4-9. In addition, changes in fuel use in the utility generation sector and other customer sectors are reflected in the natural gas and fuel oil impacts.

Natural gas demand is projected by CEC to grow by about 50 percent in the baseline from 1987 to 2010 (from 871 to 1,327 billion cubic feet) without conservation measures. This increase in demand is due to regional growth, use of natural gas as a primary fuel in various consumer sectors (including utility generation), and use as a clean fuel. The 1991 AQMP contains control strategies which could affect the natural gas demand. Specifically, as shown in Table 10-8 and Figure 10-2, the conservation measures proposed in the Plan will reduce the demand; however, the stationary and mobile source control measures will in some cases increase demand and in others decrease it depending upon the extent and type of control. The net impact of the AQMP combined with regional growth is an increase in natural gas use from 871 billion cubic feet in 1987 to an estimated 1,127 to 1,320 billion cubic feet in 2010.

Current pipeline capacity to move gas from producing regions to Southern California will not be adequate to meet the future baseline demand projected by CEC. The PUC has agreed that the state needs additional pipeline capacity. An assessment of various levels of pipeline capacity additions reveals that under adverse weather conditions minimal curtailment could still occur if approximately one half of the currently proposed pipeline additions becomes operational. Further analysis on the issues such as pipeline capacity additions, curtailment priorities, gas storage capacity, and storage operating policies is necessary to minimize natural gas curtailment.

The District will continue to advocate the use of clean, renewable sources, such as solar, wind, and geothermal. This will lead to reduced emissions, energy independence, and offset any possibility of natural gas curtailment. Since the draft AQMP analysis was conducted, construction on two major pipelines has actually been started, so the "half-pipe" case merits revision. Increased pipeline capacity assumptions should reduce the probability of curtailment of instances of force majeure or extreme weather conditions.

TABLE 10-7

Energy Impact of Fossil Fuels^(a)
 1991 AQMP
 (Million Gallons per Year)

Fuel Type	1987	2000		2010	
		w/o AQMP	w/AQMP	w/o AQMP	w/AQMP
Natural Gas ^(b)	871	1,235	1,082 to 1,115	1,327	1,127 to 1,320
Fuel Oil ^(c)	285	327	17	479	49
Methanol	0	Unknown	0 to 800	Unknown	0 to 3,000
LPG	0	Unknown	0 to 800	Unknown	0 to 2,400
Gasoline	4,971	5,329	4,989	5,845	2,445
Diesel	557	595	518	651	531

- (a) Changes are relative to baseline projections. Ranges reflect potential alternative-fuel vehicle penetration levels.
 (b) Unit in billion cubic feet per year.
 (c) Fuel use by stationary sources, including electric utilities.

TABLE 10-8
Summary of Natural Gas Impacts
1991 AQMP
(Billion Cubic Feet per Year)

	1987	2000	(% Diff)	2010	(% Diff)
Baseline Forecast	871	1235		1327	
<u>Scenario Changes</u>					
Demand-Side Management		-50	-4	-84	-6
Stationary Controls		-52	-4	-37	-3
Motor Vehicles ^(a)		-6 to +28	0 to +2	-82 to +112	-6 to +8
Combined Effect		-108 to -74	-8 to -6	-145 to +48	-11 to +4

(a) Decrease in demand is due to CEC's assumption that natural gas demand in the utility electric generation sector will be curtailed in order to meet the CNG requirement.

Impact of the 1991 AQMP on Natural Gas

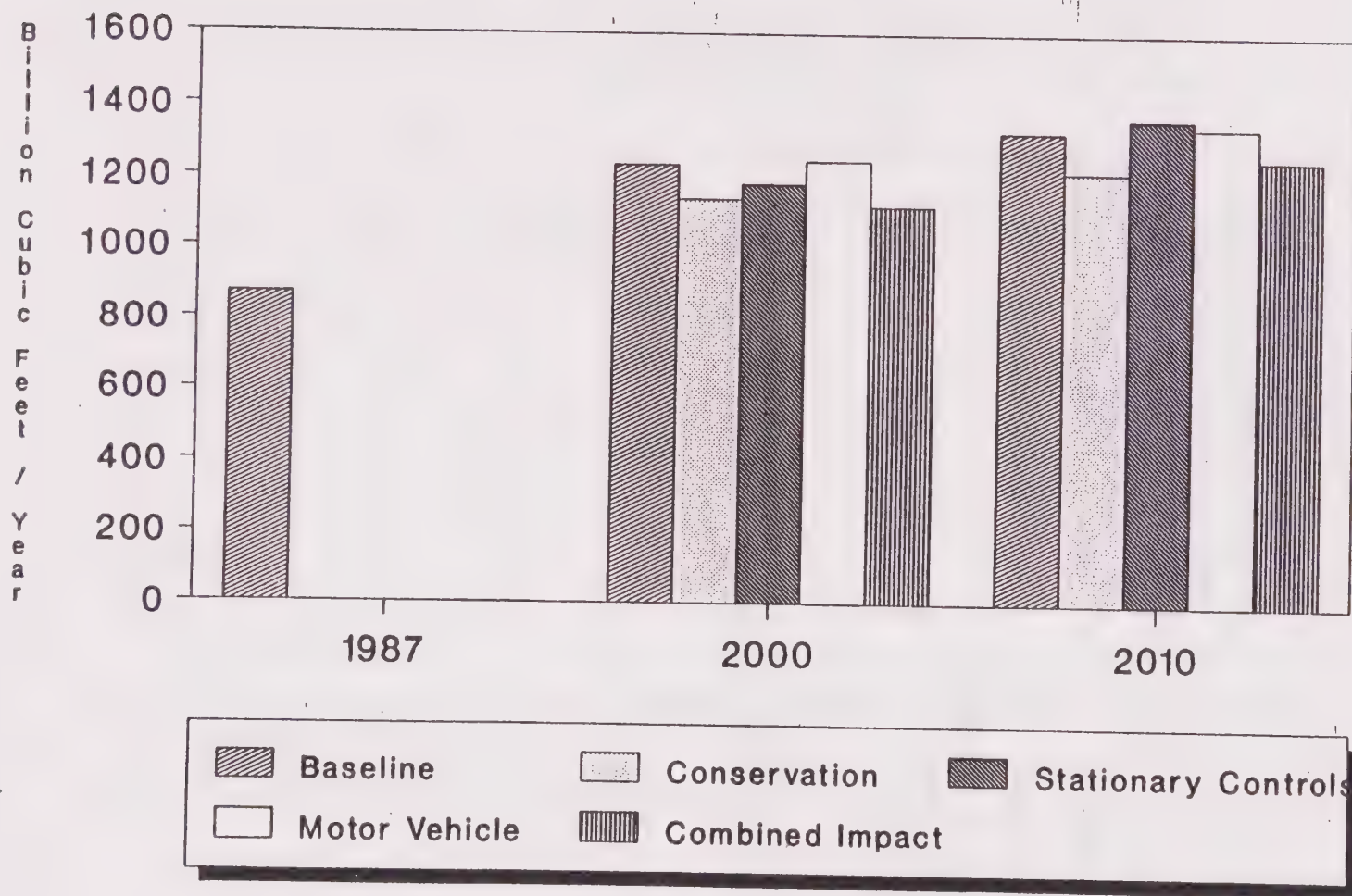


FIGURE 10-2

Comparison with the 1989 AQMP

Three major improvements have been made in assessing the energy impacts for the 1991 AQMP in comparison with the 1989 AQMP: (1) assumptions used in the 1991 AQMP reflect a consensus developed by the Energy Working Group and are consistent with assumptions used by state energy agencies in their planning proceedings; (2) the ELFIN production cost model was used to assess the electric resources needed for the 1991 AQMP versus a preliminary screening analysis for the 1989 AQMP; and (3) various energy models developed by CEC were employed to assess energy impacts on fossil fuel demand for the 1991 AQMP, whereas fossil fuel impacts were not analyzed in the 1989 AQMP.

Table 10-9 compares the electricity impacts of the two Plans. As can be seen, the net electricity impacts for the 1991 AQMP are substantially lower than those of the 1989 AQMP. The changes in control measures that cause increases or decreases in electricity impacts between various components of the two Plans include: (1) lower EV penetration targets (e.g., for passenger cars 70% in use in the 1989 AQMP vs. 17% in use in the 1991 AQMP); (2) better average EV performance expected (0.4 kwh/mi in the 1991 AQMP vs. 0.5 kwh/mi in the 1989 AQMP by 2010); (3) lower electricity energy conservation targets (15% in the 1991 AQMP vs. 30% in the 1989 AQMP); and (4) lower VMT reduction resulting from control measures proposed by SCAG (17% in the 1991 AQMP vs. 27% in the 1989 AQMP).

TABLE 10-9
Comparison of Electricity Impacts
Between the 1989 and the Draft 1991 AQMPs^(a)
(Year 2010)

Issues	1989 Plan		1991 Plan	
Demand	(Gwh)	(MW)	(Gwh)	(MW)
Conservation	-32,000	-1900	-16,800	-4,200
Stationary Control	+4,400	+500	+2,400	+560
Transportation	+56,100	+3,900	+6,900	+270
Combined Effect	+60,500	+4,400	-7,500	-3,400
Supply	Relying on Non-Polluting Technology		Economic Consideration With Air Quality Element Included^(b)	
Emission Reduction	NOx (Tons/Day)		NOx (Tons/Day)	
Conservation	-0.4		-6	

(a) Impacts are relative to the projected baseline levels.

(b) Air quality element includes costs of pollution controls, offset credits, and residual emissions.

CONTINGENCY MEASURES

In order to achieve the air quality improvements identified in the AQMP, the measures listed in the Plan must be adopted within the time frames identified, and they must result in the projected emissions reductions. The ongoing air quality planning process includes an audit program (the Reasonable Further Progress report process) to verify progress toward attainment goals.

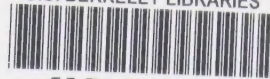
If control measures are not adopted by the date specified, or if they do not result in the projected emissions reductions, the District must take one of two courses of action. First, measures scheduled for later adoption or implementation must be brought forward for earlier action. Secondly, certain "contingency" measures could be instituted in place of the Plan's measures. Table 1 lists currently proposed contingency measures, actions needed prior to implementation, and responsible agencies. Appendix IV-C, prepared by the District, and Appendix IV-E, prepared by SCAG, provide a more detailed discussion of these measures. These contingency control measures may not be prudent or acceptable either publicly or politically and may require additional authority or new legislative. However, measures deemed viable in the future will be implemented to provide additional control options.

It should be noted that the California Clean Air Act (CCAA) requires the District to identify contingency measures. According to CCAA, these measures are to be implemented in the event the District fails to achieve interim emission reduction goals ~~or~~ maintain adequate progress toward attainment of ambient air quality standards.

TABLE 1
Contingency Control Measures

AQMP Measure No.	Title	Responsible Agency	Activities	Appendix No.
T-1	Additional Taxes on Gasoline and Diesel Fuels Used in Motor Vehicles [All Pollutants]	District	Legislative Authority	IV-G
T-2	Limits of Vehicle Registration [All Pollutants]	State	Further Study	IV-G
T-3	Emission Charges on Parking Lots [All Pollutants]	District	Further Study/ Legislative Authority	IV-G
T-4	Emission Charges on Vehicle Use [All Pollutants]	District	Further Study/ Legislative Authority	IV-G
T-5	Reduction of VMT to 1985 Levels [All Pollutants]	SCAG	Expanding Tier I Programs	IV-G
T-6	Highway User Fees [All Pollutants]	SCAG	Further Study/ Legislative Authority	IV-E
T-7	Time and Place Control Measures	District/ SCAG	Further Study	IV-G IV-E
T-8	More Stringent Emission Standards For Federal Vehicles	EPA	Further Study	IV-G
T-9	Emission Charges of \$5,000 per Ton of ROG for Stationary Sources Emitting Over 10 Tons Per Year	District	Further Study	IV-G
T-10	Zero-Emission Vehicles Monitoring and Commercialization	District	Further Study/ Legislative Authority	IV-G

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